# PACKAGE engineering

## How to print pouches on the line

The printing of packages after forming and before filling depends on such details as maintaining control of the web, avoiding paper stretch, and coordinating the speeds of printing cylinders and the moving of the web. (See page 15)

## Folding cartons and high speeds

To get cartons that perform well at high speeds, a user must articulately specify his requirements and must help his supplier to understand these needs and the reasons for them. (See page 18)

## Permeability of plastic bottle materials

Examining twelve chemicals to illustrate factors contributing to permeation rates of ten different polymers — showing (with data) how each has its own permeability properties. (See page 21)

**Complete table of contents on Page 2**

**JANUARY 1958**

VOLUME 3 • NUMBER 1

# Stamped and Wrapped

## by SCANDIA

HARD-BOX PACKS FOR THE CIGARETTE INDUSTRY

**SCANDIA**

*Manufacturers of Better Packaging Machinery*

• 500 BELLEVILLE TURNPIKE • NORTH ARLINGTON, N. J. •

BUNDLING • BANDING • MULTIPLE WRAPPING • STAMPING • HIGH SPEED WRAPPING

For more information circle No. 201 on Reader Service Card

# Aluminum Foil Packaging-Expansion of Research Facilities

***Report No. 13 of a Series by Reynolds Metals Company***

REPORT NO. 1 of this series detailed the research staff and the laboratory facilities which provide basic data for these reports. The ever-widening acceptance of aluminum foil materials and the continually expanding range of products being packaged in these materials have, of course, necessitated considerable additions to the laboratory. Now, as the series embarks on its third year, it is important once again to familiarize the reader with the expanded staff and facilities responsible for these technical reports.

Primarily, the basic purposes of this laboratory are: continual evaluation and improvement of performance and economy of currently used aluminum foil packaging materials; investigation and development of all materials used in conjunction with foil (papers, adhesives, inks, coatings, waxes, hot melts, plastic films, etc.); and exploration and invention in entirely new areas of flexible, semi-rigid and rigid packaging with aluminum. This includes the development of associated production type machinery.

## Operate Pilot Plant

In order to fulfill these aims, Reynolds maintains not only the packaging laboratory, but also a fully integrated pilot plant for the development and production of aluminum packaging materials. Since the actual use of a product provides still another testing ground for the packaging of new products or the adaptation of existing equipment to aluminum foil materials, technical services rendered right in customers' plants have become yet another important area covered by the Research and Development Department. This technical assistance is available through Reynolds regional representatives.

Newly acquired package testing equipment in the laboratory includes walk-in temperature cabinets, a combination plate and blast freezer, and several different types of in-store display refrigerators and freezers. This is in addition to the spectrophotometer, complete photographic equipment and laboratories, vibration testing machinery, Atlas fadeometer, temperature, humidity and moisture vapor transmission cabinets, and various other paper, film and foil testing apparatus which were detailed in Report No. 1. The laboratory also maintains a test kitchen completely equipped with both gas and electric appliances.

The pilot plant, now housed in an entirely new building, has been expanded with the addition of a 4-color gravure printing press, a plastics extruder and laminator, and new equipment for coating, laminating and spooling foil. Also available are bag making machinery, several different types of heat sealers and other package making equipment which was described in Report No. 1.

The increasing rate of technological advance in several diverse fields of aluminum foil packaging, as well as the enlarged scope of the Department itself, has necessitated a 50% increase in the number of scientists and technicians on the staff.

## Results Speeded

Over-all expansion and integration of the laboratory and pilot plant facilities—the world's most extensive 2 years ago and larger than ever today—result in the following benefits to Reynolds and to Reynolds customers:

1. More rapid completion of packaging material development.
2. Faster evaluation of new products and processes.
3. Earlier preparation of sample materials for field testing.
4. Provision of basic manufacturing data to assure success of original production orders.
5. Maximum security in handling customer projects of a confidential nature.

The past discoveries of this laboratory have been significant—among them new data relating the properties of aluminum foil to vacuum packaging, heat conductivity and reflectivity, vitamin and flavor retention, antioxidants, bacteriology, and other highly specialized fields. These discoveries will continue to be reported in this series.

Remember, your local Reynolds representative can place at your disposal the facilities and staff of the world's most complete aluminum foil packaging laboratories. Call him. Or write to **Reynolds Metals Company,** General Sales Office, Louisville, 1, Kentucky.

©Reynolds Metals Company, Louisville, Ky.

### *Earlier Laboratory Reports*

**No. 1 Research and Development Laboratories for Aluminum Foil Packaging**
**No. 2 Aluminum Foil Packaging as a Moisture Vapor Barrier**
**No. 3 Aluminum Foil Packaging as a Gas Barrier**
**No. 4 Aluminum Foil Packaging as a Grease and Oil Barrier**
**No. 5 Aluminum Foil Packaging as an Insulator**
**No. 6 Aluminum Foil Packaging as a Light Barrier**
**No. 7 Aluminum Foil Packaging as Protection Against Contamination**
**No. 8 Aluminum Foil Packaging—Versatility and Compatibility Unexcelled**
**No. 9 Aluminum Foil Packaging—Advantages of High Thermal Conductivity**
**No. 10 Aluminum Foil Packaging—Resistance to Insect Infestation**
**No. 11 Aluminum Foil Packaging—Resistance to Heat and Flame**
**No. 12 Aluminum Foil Packaging as a Material for Printing**

A limited number of these reports is still available. Write for copies you may wish, specifying Report Number.

Watch Reynolds all-family television show "Disneyland", ABC-TV.

JANUARY 1958 • VOLUME 3 • NUMBER 1

# PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

## For your calendar

**January 6-8.** AMA Packaging Conference (special packaging conference), Commodore Hotel, New York. Contact: John A. Warren, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

**January 20-23.** National Canners Association Convention, Traymore Hotel, Atlantic City. Contact: Nelson H. Budd, National Canners Association, 1133 20th Street, N. W., Washington 6, D. C. *Telephone: Executive 3-7030.*

**January 19-23.** Canning Machinery and Supplies Association Exhibit, Convention Hall, Atlantic City. Contact: W. D. Lewis, Secretary, Canning Machinery and Supplies Association, 4630 Montgomery Avenue, Washington 14, D. C. *Telephone: Oliver 6-6979.*

**January 27-29.** AMA Packaging Clinic, The Economics of Packaging Machinery, New York. Contact: John A. Warren, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

**March 24-26.** PMME Technical Sessions, sponsored by the TOC Committee of Packaging Institute, Convention Hall, Atlantic City. Contact: Charles A. Feld, Packaging Institute, 342 Madison Avenue, New York 17, New York. *Telephone: Murray Hill 7-8875.*

**March 25-28.** The Packaging Machinery & Materials Exposition of 1958, sponsored by the Packaging Machinery Manufacturers Institute. Contact: Hanson & Shea, Inc., Exposition Management, Suite 759, One Gateway Center, Pittsburgh 22, Pennsylvania. *Telephone: Atlantic 1-8552.*

**May 26-28.** AMA National Packaging Conference, Hotel Statler, New York. Contact: John A. Warren, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

**May 26-30.** AMA National Packaging Exposition, New York Coliseum, New York. Contact John A. Warren, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

See us at
The Packaging Machinery
and Materials Exposition
March 25-28, 1958
at
Convention Hall, Atlantic City
Booth 904

## Articles

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*Coordinating the factors contributing to in-line printing, including maintaining web control, avoiding paper stretch, dovetailing printing cylinder speeds and that of the web.*

18 **What high speeds demand of folding cartons,** by W. L. Romney, technical director of packaging, The Procter & Gamble Company
*Emphasizing a user's responsibility in helping suppliers produce suitable cartons, and discussing factors contributing to high speed cartoning.*

21 **Permeability of plastic bottle materials,** by A. R. Nielsen, research chemist, and E. J. Temple, technical sales engineer, Plax Corporation
*Using twelve different chemicals to illustrate factors contributing to permeation rate, the article reviews ten polymers recorded, showing the permeability of each.*

27 **Taking a "new look" at our odor, flavor transfer problems,** by S. F. Brockington, section leader, quality standards, research laboratory, The Quaker Oats Company
*A bibliography of 64 references accompanies this discussion of basic phases of odor and flavor transfer.*

38 **Engineering approach leads to economical packaging standardization,** by Nick Stuffer, design engineer, Westinghouse Electric Corporation
*Planning and carrying out a four-point program of (1) inventory reduction, (2) economical standardization, (3) basic simplification, and (4) adequate protection.*

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**Reader Service Card inside back cover.**

**Our December 1958 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.**

**The one case where**

# Feeling the Film is Knowing the Fabric!

SHEER and soft to touch, VITAFILM is the one transparent packaging film that transmits the *true color* and *true "feel"* of fine fabrics *right through* the package!

Not only pleasing to touch and possessing wonderful contact clarity—this unique Goodyear film doesn't attract dust!

VITAFILM is as rugged as it is glamorous: Customers can paw and poke their way to buying without denting the protection VITAFILM affords fine products.

Prints beautifully, adapts smoothly to high-speed packaging machinery, heat-seals to a welded "won't part" seam, has long shelf-life.

And the cost? Lower than ever in history!

WHY WAIT? Call or write: The Goodyear Packaging Engineer, Packaging Films Dept. M-6432 Akron 16, Ohio.

The greatest thing you can place between you and your customer

Vitafilm by GOODYEAR

The finest in sheer protection

Vitafilm, a Polyvinyl chloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

# A note from the Publisher

Dr. Frank Campins is credited with the statement, "A technical education used to last a man a lifetime; now it runs dry in ten years or less unless it is constantly replenished."

This statement parallels the thinking behind the editorial efforts of PACKAGE ENGINEERING to provide a continuing medium of adult education — to help the men responsible for the profitable operation of their companies' packaging operation keep abreast of current ideas and practices in the field.

Reading a well-edited business magazine is unquestionably the best way to be aware of what is going on. Both the editors of, and the advertisers in, PACKAGE ENGINEERING tell you each month about the newest, the most significant, and the most important developments in the field. PACKAGE ENGINEERING's editorial material is specifically edited for men concerned with the function of package engineering and we endeavor, whenever advisable, to help suppliers in the field prepare advertisements that will prove helpful to you.

It is our opinion that our advertisers have been unusually successful in providing pertinent and factual information for our readers, and it would be impossible to use any single ad as a shining example to illustrate this point. All have been excellently done. Those of interest to you should be clipped and filed along with articles that are of particular interest to you and kept for future reference.

To illustrate, there were advertisements in our December issue that discussed factors governing printing on both foil and polyethylene; a new paper coating that prevents paper from sticking to practically anything; factors influencing successful labeling; properties of multiwall bags in which one ply is foil; a machine to measure and record shock in transit . . . . and these are only a few of the subjects covered in the 52 ads that appeared.

The point is this: "If there are any readers of PACKAGE ENGINEERING who do not carefully go through the advertising pages as well as the editorial pages, they are short-changing themselves. To keep your technical know-how up to date and constantly replenished, you must read *both* the advertising and editorial pages.

Reading, however, is only part of the process of continuing education. Talking to other packaging people, not only in similar businesses but in dissimilar businesses also, frequently provides ideas from the packaging of products entirely different from your own. Trade shows, of course, provide an excellent means of meeting and talking to many people with problems similar to yours and actually seeing in action the various products that interest you.

In 1958 there will be four trade shows that are strictly packaging. The Packaging Machinery and Materials Exposition is being held in Atlantic City in March; the National Packaging Exposition in New York in May; the West Coast Packaging Show in San Francisco in August; and the SIPMHE Show in Chicago in October.

Plan now to take in at least one of these excellent shows as part of your "continuing education."

Angus J. Ray
Publisher


**PACKAGE engineering®**

**AN ANGUS J. RAY PUBLICATION**

**Angus J. Ray**
Publisher

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Package Engineering is published monthly by Angus J. Ray Publishing Co., 185 North Wabash Avenue, Chicago 1, Illinois. Angus J. Ray, president; R. B. Holmgren and I. F. Megargee, vice presidents; James G. Culbertson, secretary and Ethyl K. Ray, treasurer. Please address articles for publication and correspondence regarding the editorial content to the editor. Statements and opinions expressed in articles and editorials are those of the respective authors, for which Package Engineering assumes no responsibility.


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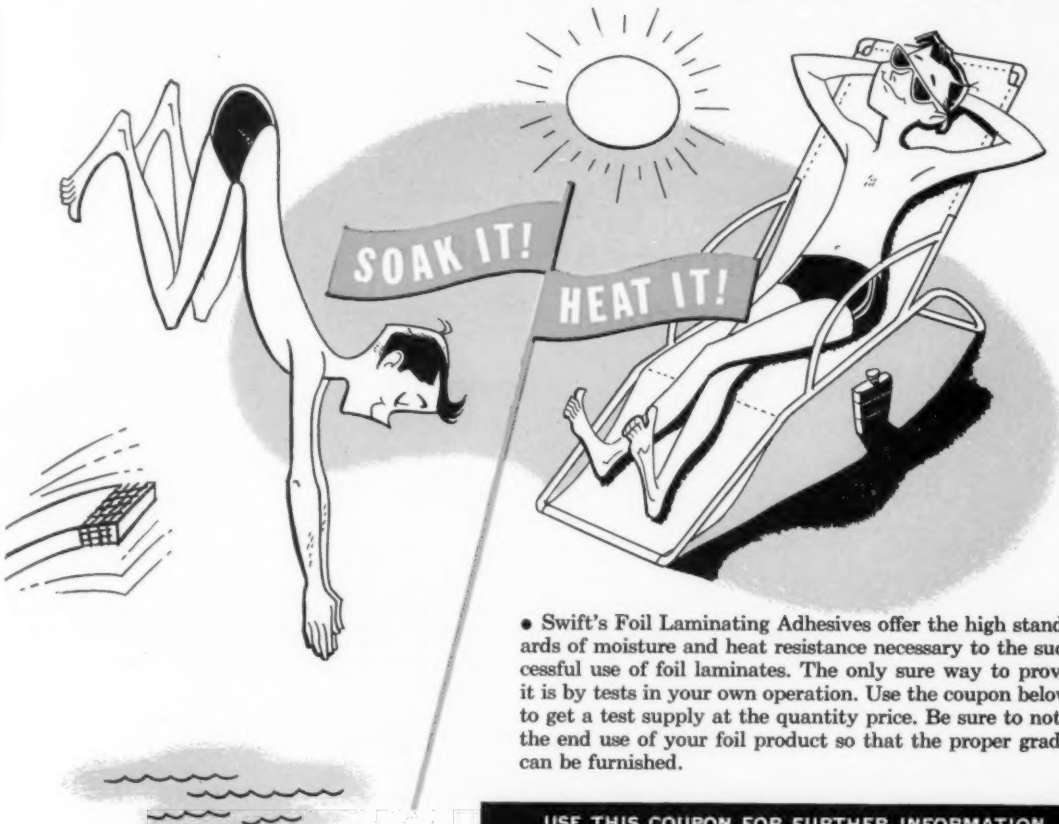
Package Engineering is indexed in Engineering Index.

Member of Business Publication Audit of Circulations, Inc.

BPA

Here's how to prove the superiority of

# SWIFT'S FOIL ADHESIVE




• Swift's Foil Laminating Adhesives offer the high standards of moisture and heat resistance necessary to the successful use of foil laminates. The only sure way to prove it is by tests in your own operation. Use the coupon below to get a test supply at the quantity price. Be sure to note the end use of your foil product so that the proper grade can be furnished.

**USE THIS COUPON FOR FURTHER INFORMATION**

Swift & Company
Adhesive Products Dept.
Chicago 9, Illinois

Please send me a ten gallon drum of Swift's Foil Adhesive at the quantity price. End use of our foil product is

.....

Name.....

Title.....

Company.....

Address.....

City.....Zone.....State.....

Swift
102ND YEAR

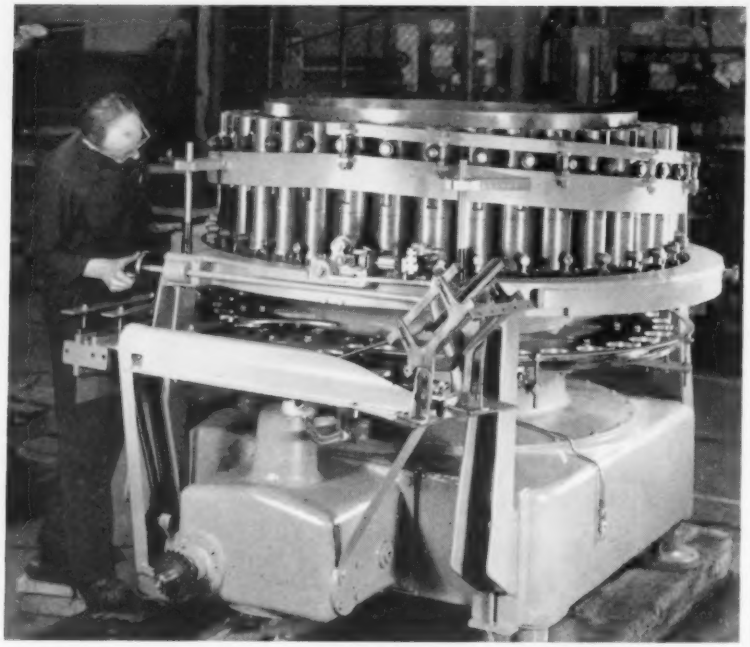
*To Serve Your Industry Better*

**with these ADHESIVE PRODUCTS**

Resins and Rubbers in Emulsion or Solvent
Industrial Bonding Compounds
Dry, Liquid and Flexible Animal Glues
Liquid Dextrin Adhesives



For more information circle No. 204 on Reader Service Card



## Now, fill 600 quarts of lube oil per minute without spill!

*NEW Pfaudler RPL-36 filler gives you many other operating advantages*

Regardless of viscosity, you can fill 600 quart cans a minute with this new Pfaudler filler . . . the fastest lube oil filler on the market.

Look at these additional features of the RPL-36:

- No slop-over to stain your cartons.
- Accurate to ± .1 oz. by volume.
- Filling adjustments are made easily from either side *while the machine is running.*
- Uniform acceleration of infeed screw for empties prevents jamming at high speeds.
- Straight-line discharge to closing machine.
- Synchronized transfer of containers to closing machine engineered to fit your process.
- Positive, high-speed *no* can—*no* fill.
- Piston and valves made of Ni-Resist. They won't rust.
- Cylinders are centrifugally cast of non-porous, dense metal structure, preventing pickup of particles that might score walls.
- All filler drive mechanisms are mounted on ball and roller bearings for smooth operation and long life.
- All gears are enclosed in oil bath for positive, continuous lubrication.

Find out how Pfaudler's *new* RPL-36 lube oil filler can fit into your production setup. Send for specifications.

**THE PFAUDLER CO.**

a division of PFAUDLER PERMUTIT INC. • Rochester 3, New York

# Letters to PACKAGE engineering

Gentlemen:

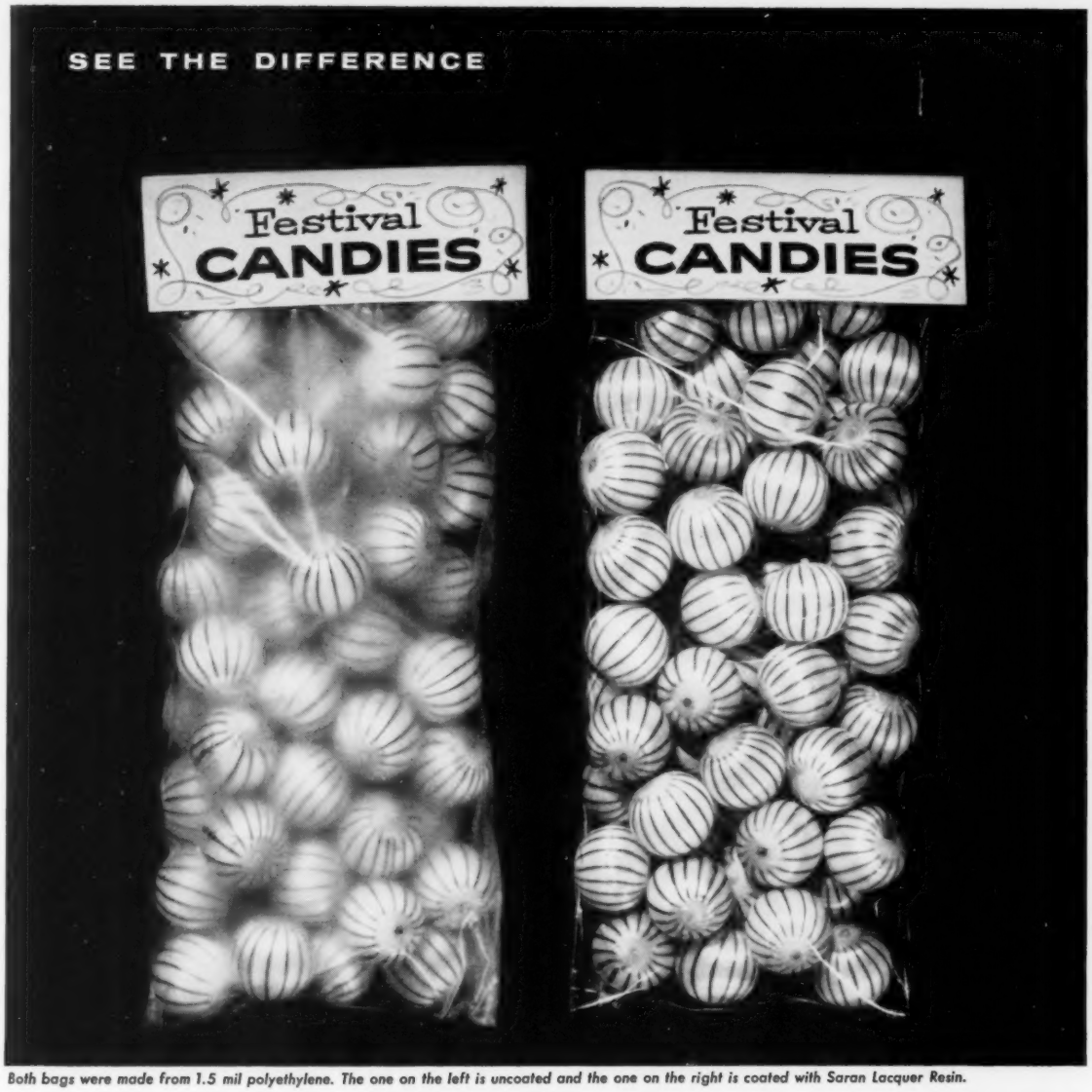
I have been called upon in recent months to investigate the packaging of some of our equipment with respect to cost reduction. Most of our shipping containers have in the past been constructed of plywood. We are presently in the process of reducing cost considerably by switching to corrugated material. This has caused me to become quite interested in the entire subject of package engineering.

In particular, I find a need for additional information on the subject of package specifications and Engineering Department procedure in studying applications, cost reduction, etc. The two articles in this issue dealing with specifications, and an article in the October issue concerning "Determination of Packaging Costs" have been very helpful. I would appreciate if you could send me a copy of the article referred to, "How to Set Up a Package Development Department."

I might add that I have enjoyed each issue of Package Engineering received. I believe you present a well rounded diet of technical information seasoned with practical know how. Keep up the fine work.

C. G. Nilsen
Project Designer, Eng. Dept.
The S. S. White Dental Manufacturing Company
Staten Island, New York

*We are sending you copies of the articles to which you refer. Also, we direct your attention to our cumulative editorial index for 1957, which appears on pages 64—69 of our December issue. We urge your perusal in particular of the section in the index covering the management and control of packaging, starting on*




*Both bags were made from 1.5 mil polyethylene. The one on the left is uncoated and the one on the right is coated with Saran Lacquer Resin.*

# Saran Resin F220
# brings new clarity to polyethylene

No need these days for cloudy packaging to blur the visual appeal of any product. It takes only a thin coating of Saran Resin F220 to clear up polyethylene packaging films and put the contents on sales-making display.

Along with eye appeal, Saran Resin F220 will enhance the protective properties of your polyethylene . . . reduce gas transmission rate . . . increase resistance to oils, greases, acids and many organic liquids and vapors. It all adds up to new usefulness for polyethylene.

Saran Resin F220 saves you time and money in the coating operation . . . on your present equipment. It is soluble in acetone, releasing solvent at lower temperature. Less coating is required . . . coating cycle is speeded up . . . costs are lowered.

Let us send you the technical data. You'll see how easy it is to add all these advantages to your packaging films . . . and paper, too . . . with Saran Resin F220. Write THE DOW CHEMICAL COMPANY, Midland, Michigan, Coating Sales Department 2256 A.

*YOU CAN DEPEND ON* DOW

**Boxmaster cuts costs for... PAPER GOODS**

**"Saved several cents per box, saved space, got stronger box"**

**A producer of engraved stationery now forms rigid boxes from die cut blanks as they're needed. He gets extra durability; and is very pleased with the down-to-earth savings he's making.**

**Data:**
- Gets flexibility — any of several employees can form 1000 complete boxes in a few hours each day.
- Semi-automatic operation.
- Flat die cut blanks take far less storage space than former boxes delivered all set-up.
- Blanks cost approximately $30 per thousand less than set-up cartons, including a die-cut window which required an extra operation before.

**Whatever your product,** if you put it in a box, and now use 800 to 10,000 boxes a day — you should send for complete data on Boxmaster. Learn all the ways it can help improve your packaging — and your profits.

**United**
Shoe Machinery Corporation
140 FEDERAL STREET
BOSTON 7, MASSACHUSETTS
*Boxforming by BOXMASTER*

**For more information circle No. 207 on Reader Service Card**

**CHAFFEE ROTOR-SEALER**

**In Production Line Sealing**
**The #1 Sealer**

**WHY?** Because it seals all popular sealable materials. You may change your package from sealing bag top labels on cellophane, polyethylene, pliofilm and saran to the sealing of unsupported films, viz; cellophane, polyethylene, pliofilm, vinyl by simply turning the thermostat dial.

*Military Approved Sealer Available*

RALPH CHAFFEE & CO.

2358-2360 MARKET ST. SAN FRANCISCO 14, CALIF.

*REPRESENTATIVES IN PRINCIPAL CITIES*

*page 65. Similarly, the listings under the heading Materials, starting on page 66, will prove of interest to you in your particular project. We are keenly aware of the general interest in the topic your letter summarizes and plan to carry specifically pertinent material in forthcoming issues.*

Gentlemen:

Mr. Ray's "A note from the publisher," appearing on page 4 of your November issue is most provocative. It is also more than a little reassuring for we do sometimes feel that hardly anybody but us could come upon such tough questions to answer.

In this spirit of brotherhood we hasten to send you a partial catalog of bag packing equipment designed and built by Bemis. While we have other equipment even now that is not described in our catalog and expect to continue producing new developments, we sincerely hope that the bulletins it does contain will answer a question for you folks at least once in awhile.

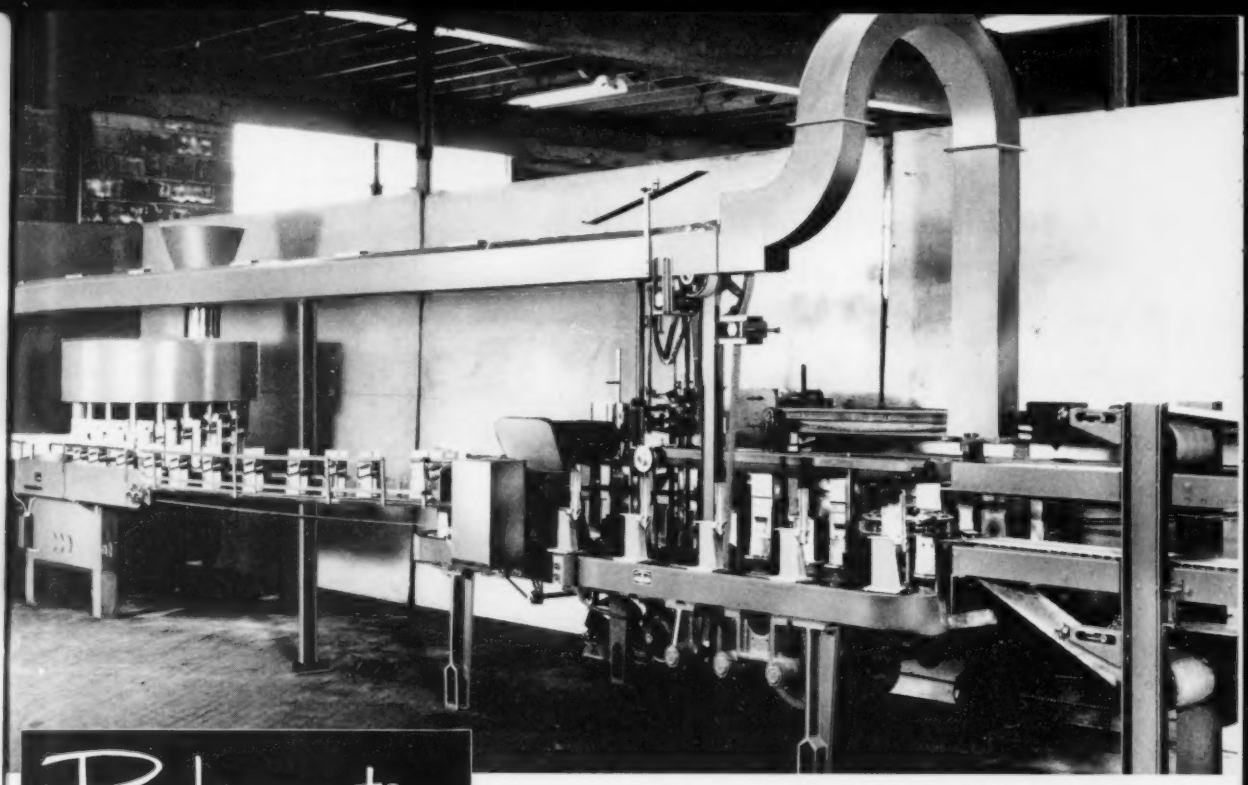
We also invite you to consult with us whenever you might be seeking answers to any questions about packaging materials in bags of any kind. We promise not to hesitate at all about referring to you for answers to some of the questions we get and you can just about expect that some of us will be stopping in Chicago to prowl around your library from time to time.

R. J. McDonald
Packaging Service
Bemis Bro. Bag Co.
Minneapolis

Gentlemen:

In looking over the November issue, we observed that you are compiling a packaging library. This is a very commendable contribution. Are you interested in complete catalogs? If so, we would be glad to make up a special catalog containing all of our weighing equipment in a neat, plastic bound style with the Exact Weight name down the back

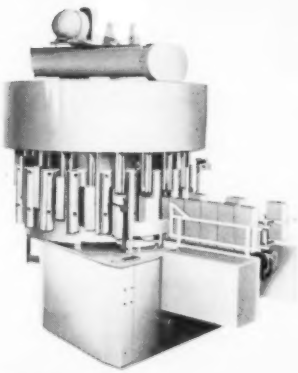

**For more information circle No. 208 on Reader Service Card** **For more information circle No. 209 on Card →**



Packomatic
T.M. Reg. U. S. Pat. Off.

This complete filling-packaging line, including carton sealer-feeder, telescoping volumetric filler and top-bottom case gluer takes up less than 1000 square feet of floor space.

# CUSTOM ENGINEERED MACHINES FOR SEMI AND FREE-FLOWING PRODUCTS



If you package dry, semi or free-flowing products—flour, detergents, soda, cleansers, insecticides, soap powders—if you want to fill those hard-to-handle products the dustless way, let a Packomatic sales engineer show you the exclusive method of flowing products into containers—round or rectangular. At speeds in excess of 100 units per minute, Packomatic telescoping volumetric fillers and augers are accurate, fast and especially economical to own. And automatic, of course.

**MODEL TVF**

Approximately 4 ft. in diameter, equipped with optional direction in-and-out, or straight-line feed. Speeds: round cartons, 60-175 per minute; rectangular cartons, 60-120 per min. Custom models available.

**AUGER PACKER-WEIGHER**

This turret-type machine handles flour and other soft-powdered products in containers from 6" to 22" high. Automatically fills and accurately weighs from 1 lb. to 25 lbs.

**J. L. FERGUSON COMPANY • JOLIET 1, ILL.**

New York, Chicago, Cleveland, Boston, Tampa, Baltimore, Portland, Denver, Los Angeles, San Francisco, Seattle, New Orleans, Louisville, Kansas City and all principal Canadian cities.

By doing this and that

**TO THESE AND THOSE AND THEM**

the men at HPS produce

**PACKAGING WITH A PURPOSE**

**for such applications as:**

**INSULATION:** Aluminum foil (to deflect heat) is laminated to flame-resistant Kraft (to retard fire), and reinforced with Fiberglas scrim (for tear resistance).

**MOISTURE BARRIER:** Polyethylene as a laminant (to impede moisture) is sandwiched between two layers of Kraft (for durability) and used as a liner or an overwrap.

**CONTAINER:** Paper is coated with Polyethylene (to stop grease and moisture transmission), for converting into heat-sealed bags for foods, parts, or semi-solid materials.

**PIPE JACKET:** Flame resistant Kraft paper (creped for moldability) is laminated to both sides of Aluminum foil (to repel moisture) and used as covering for ducts and pipes.

Plus many other combinations for many other functions

**If yours is a Barrier Problem:**

Developing barriers is a specialization at HPS . . . has been for over 50 years. Let us know your requirements. They may match or parallel those we have met before. No obligation.

PIONEERS IN DEVELOPING & PRODUCING

**H·P·SMITH** PAPER CO.

5011 W. SIXTY-SIXTH ST • CHICAGO 38 • PO. 7-8080

HPS

PROTECTIVE PACKAGING MATERIALS

of the binder for quick reference.

J. E. Konkle
The Exact Weight Scale Co.
Columbus, Ohio

*The comments of Mr. McDonald and Mr. Konkle typify the supplier reaction to our establishment of a packaging library. We are keenly aware of the fact that manufacturers' and suppliers' literature includes much more than mere product descriptions or equipment specifications. Many of these pieces reflect the application of engineering talent of the highest order. Presentations of data and aids to calculations are of distinct help to package users. At the same time, the specific details on material properties, machine capacity, and similar points are of specific help to users seeking to find what they need for a particular operation. As we welcome users to our library, we acknowledge the help of suppliers in furnishing literature and data that enhances the value of our library.*

Gentlemen:

In your November 1957 issue under title "Measurements Are Important" you mentioned two articles entitled "How to Measure a Corrugated Box Correctly" and "Another Way to Measure a Corrugated Box."

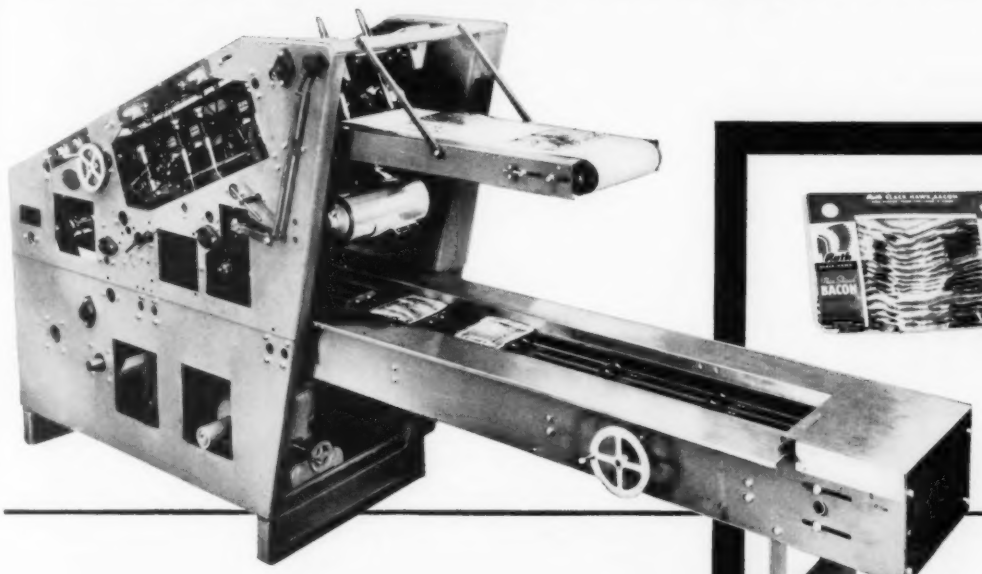
If at all possible, we would appreciate receiving a few copies of each aforementioned article.

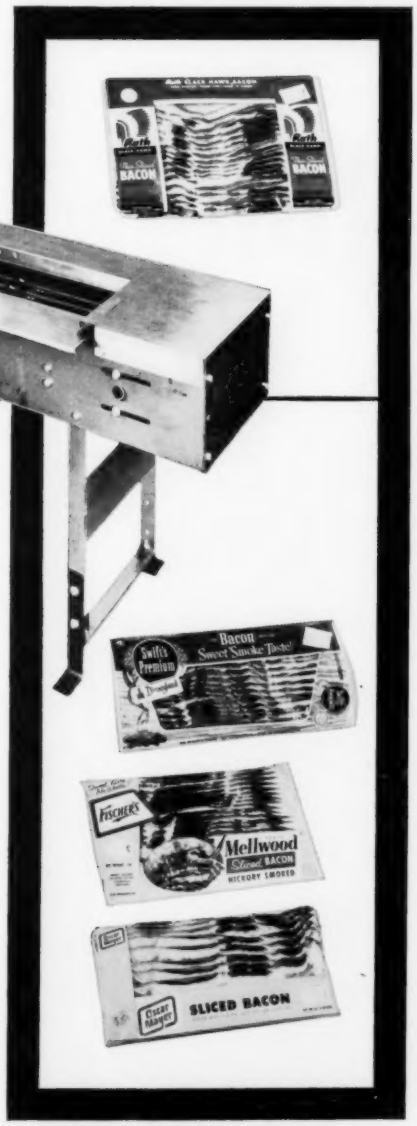
R. C. Swartz
Product Technician
Packaging
AMP, Inc.

*Our comment on the importance of measurement was in connection with Allyn C. Beardsell's article "How Good Is Your Fibreboard Box Specification?" The articles you refer to are by M. J. Harnist and Charles J. Zusi respectively. Mr. Harnist's article appeared on page 18 of our June 1956 issue and Mr. Zusi's article on page 36 of our July 1956 issue. We should like to remind you that our January 1957 issue carried our Cumulative Editorial Index for 1956. Our Cumulative Editorial Index for 1957 appears in our December issue. We are sending you the articles.*

## WRAP TIGHT, ATTRACTIVE BACON PACKAGES

# WITHOUT SIZE ADJUSTMENTS






You can alternate one-pound and half-pound packages on the Package FB-1 Bacon Wrapper without any adjustment. Using either cellophane, Pliofilm, or Cryovac the self-measuring paper feed pulls only the amount of material needed for each wrap. The folding and sealing mechanism draws down a tight, flat, air-sealed package that is easy to handle, preserves quality and increases display value.

An intermittent chain flight conveyor carries individual packages, makes the Model FB-1 self-clearing. Speeds adjust between 20 and 50 packages a minute with a simple hand-wheel control. Only sanitary stainless steel surfaces contact the package. Reciprocating sealing plates are teflon-coated to prevent the accumulation of sticky carbon and bacon grease. Self-aligning bearings and rugged steel frame help reduce down time, add to service life.

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Photo shows how Seban AR-1—carton-sealing adhesive—produces a fast, strong bond. Seban holds, the paper fiber tears. This speed test can be duplicated on actual packaging machinery. Seban grabs in less than 5 seconds, produces a good bond in 12 seconds and tears paper completely within 17 seconds. Choose Seban for fast developed tack, strong bonds.

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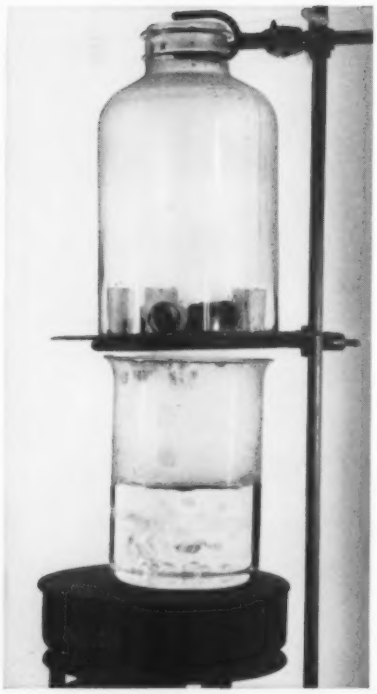

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**William L. Jaeger** attended New York University and Pratt Institute. He is a graduate of the Mechanics Institute in machine design. For the past 25 years he has been in charge of all phases of the production and packaging of Tintex Home Fabric dyes and other products of his company. He is a member of the American Association of Textile Chemists and Colorists.

# DEVELOPING AND OPERATING THE IN-LINE PRINTING OF PACKAGES

By WILLIAM L. JAEGER,
Head of Plant Operations and Production,
Park & Tilford,
New York

**A search for** *a successful in-line printing operation pinpointed a variety of problems — maintaining control of the web, avoiding paper stretch, coordinating the speeds of printing cylinders and the moving web, for example. Working through all these difficulties, Mr. Jaeger, his organization, and its suppliers evolved an operation giving acceptable printing on both sides of an envelope in the course of its being formed from a web. In reviewing how he spearheaded this project, Mr. Jaeger sets forth a clear explanation of some basic aspects of package printing.*

Faced with the problem of packaging 54 different colors of our Tintex home fabric dyes (each package requiring specific identification), it occurred to us that a vertical printing operation as an in-line step of a package-making and filling operation would be our answer.

We saw a number of benefits in having such an arrangement. We could eliminate the inventorying of 54 different fabricated pouches or envelopes. We could eliminate the need for separate circulars containing informative copy. We would have closer control over package identification.

At first glance it appeared all we had to do was to install the vertical printing equipment in line with our package forming and filling equipment. The start of our project was to have enough open space on our Bartelt machinery to install and operate two printing units, one for each side of the envelope.

Faced with the necessity of printing both sides of each envelope, we installed two Gottscho vertical printers in order to do the job in a two-stage operation.

### Maintaining Web Control

Although a host of registration and web control problems indicated themselves to us, it appeared that since we were doing the printing while the stock was still part of the web, we would not lose control of the material. At the same time, this pointed up the necessity of having adequate coordination so that when the individual packages were cut free from the web, the cutting would be in registration with the printing. In other words, we would have to make sure our printing took place within the allotted space on each package — with no substantial deviation left or right of it.

Partly by calculation and partly by experience, we established that we would not lose control of the web and would not experience any drift. We provided a space of 18 inches within the Bartelt area in order to operate our two vertical printers. We found there was not enough drift by the end of the 18th inch to affect our control of the material movement.

This 18-inch interval means that we have nine inches following each printing unit. Since we operate this equipment at 120 packages a minute and since the web moves at a corresponding speed, it is necessary that the ink from each printing unit dry within its respective nine-inch interval. With the help of our suppliers we have secured an ink that meets these requirements.

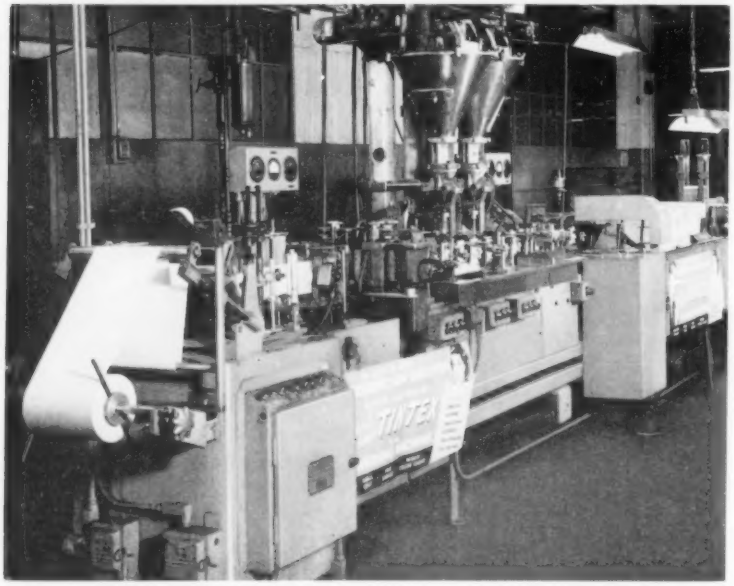
### Effect Of Rubber Wear

Our packaging material is a polyethylene-lined kraft with the kraft in pastel colors. We found that using a very dark blue ink gives us maximum visibility. Our printing equipment uses rubber plates. We get 100,000 impressions before having to change the plates, unless a change of copy indicates switching plates at some other time.

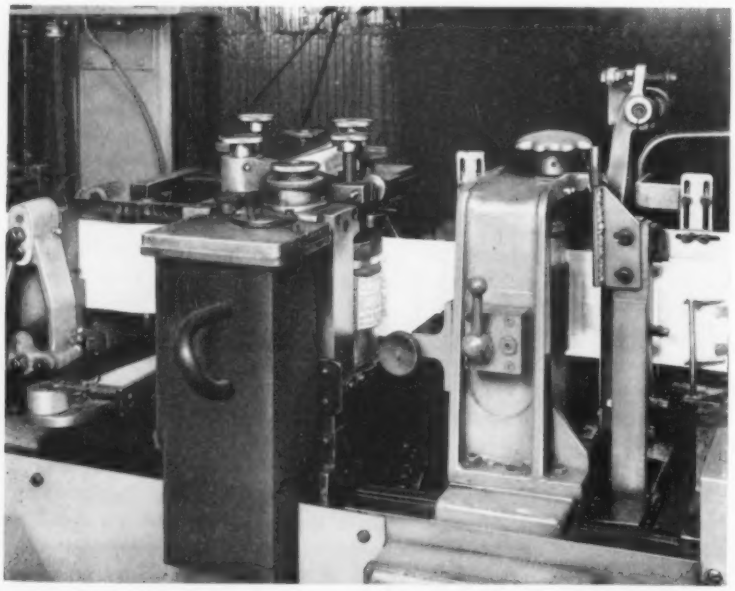
Our experience shows that the rubber does wear, but at the same time, it has a give or resiliency that is as necessary as its flexibility. This compensates for any irregularities and prevents slippage of the paper and the printing characters. We find that the rubber printing plate is conducive to our stock going through

without undue drag. In other words, the rubber acts as an attraction medium.

We found it very important to have vertical columnar bars on the printing cylinder (in effect we have two printed rules) with one on each side of the copy or text. These serve as traction bars to meet the friction difference arising at the moment of printing. There is a difference in speed due to the intermittent functioning and the relationship of the printing cylinder and paper transfer wheels. These must coincide at the moment and point of printing. The bars provide a compensation action. Also they eliminate or reduce excessive pressure and wear on the rubber itself.



**Roll stock** at left provides the packaging material for 54 different packages — each representing a different color of Tintex Home Fabric dye. In-line printing of envelopes in the course of fabrication prior to filling makes possible the use of this single material. There are two printing cylinders, positioned slightly offset with relation to each other (rather than in a straight line) in order to assure a taut web.



**Vertical bars** seen on printed stock prevent skidding of material that otherwise would occur and avoid the wearing off at the back end of the printing action. These bars (on printing cylinders) serve as traction bars to meet the friction difference arising at the moment of printing. Note that web of paper is taut, thus assuring sharp printing. Entire printing operation must take place within 18-inch space.

### Relationship Of Speeds

We found that a thorough understanding of the speed relationships between the moving web and the printing cylinder was all important to solving the difficulties inherent in packaging operations. We found it important to consider the effect of the speed build-up and the pull of the paper.

In this connection it is interesting to note that each printing cylinder is running at the speed of the paper at pick-up, but is subject to the action of an escape linkage. This is necessary so that the mechanical action is freed or relieved during the period or interval of printing. The speed at the point of pick-up has not yet reached its maximum. The movement of the cylinder must be free at the instant of contact so that the paper and printing plate can ride together, in effect, during the printing sequence.

At the same time, the two rates of speed cannot remain equal — simply because one is the cylinder and the other is the paper. The pull of the paper involves an accelerated speed. Although the cylinder is driven mechanically, the spring escape permits it to move faster when subjected to the pull of the paper.

Even so, it continues to move mechanically; as soon as the paper leaves it, the cylinder slips back to its position. In other words, the paper pull takes over the printing cylinder through friction contact. Although the paper is actually building up speed, the point of contact between the paper and the printing cylinder takes place just as the two speeds (for an instant) are gauged to be identical.

### Value Of Vertical Bars

Because of this relationship of the

speeds, the two vertical bars on the printing cylinder serve a useful purpose. For example, because of the second bar, there is no wearing off at the back end of the printing action. Without it there would always be a little skidding. Further, any wear that might occur would be on the bar itself and not on the rubber printing type.

The operation is the same for both sides of the envelope. The units are identical in their functions except that the copy for the front surface of the package contains the color legends. The printing takes place immediately after the forming stage and before the cut-off, so that the printed surface is still part of the web.

Because we imprint at the control stage, no photoelectric registration is necessary. Formation of the envelope takes place only two stages before the printing. There is not enough drift either through the paper pull or otherwise to require an electric eye. The web simply does not get out of control.

This control would be necessary if the printing took place too far back of the forming stage. Likewise, if it took place too far beyond the control point, the operation could get out of control. The result would be that the formation and cutting of the envelopes would not coincide with the positioning of the printed copy, and cutting might take place right through the copy because of the printing not being centered or registered on the envelope.

We also considered the effect of an accelerated pull. This minimizes any difficulty that might arise in connection with control of the web. In other words, the paper is pulled forward during the printing stage. This has the effect of shortening the interval during which drift occurs.

### Vital: Offset Positioning

One of the most important features of our operation is that the two printing units are positioned slightly offset (with reference to each other) so that they do not operate in a straight line. We found that starting or using a straightline printing operation created a difference in the paper pull. There was a slack or stretch between the face of the envelope and the back of the envelope.

We found we could overcome this difficulty by slightly offsetting the two printing units. Purpose of this offsetting is to pull the paper taut, in effect, pulling taut the far side of the paper. As a result, the imprint goes on at and during the place and time of the pull, as the paper moves around — and it is pulled taut during its movement.

Without this action we would have high spot printing. We would not have the correct pull and contact between paper and the printing cylinder. But by doing it this way, each side or surface is, in effect, wrapped around the rollers or cylinders. This compensates for any variances there may be. However slight may be the variations in paper, this operation compensates for them and anticipates them.

It gives us the tightness necessary for register and overcomes the possibility of any misprinting due to deficiency in the paper. For example, there could be a stretching as a result of the calendering of the paper. But since the printing takes place while the web is pulled taut, we need not be concerned with these variables inherent in the paper manufacturing process.

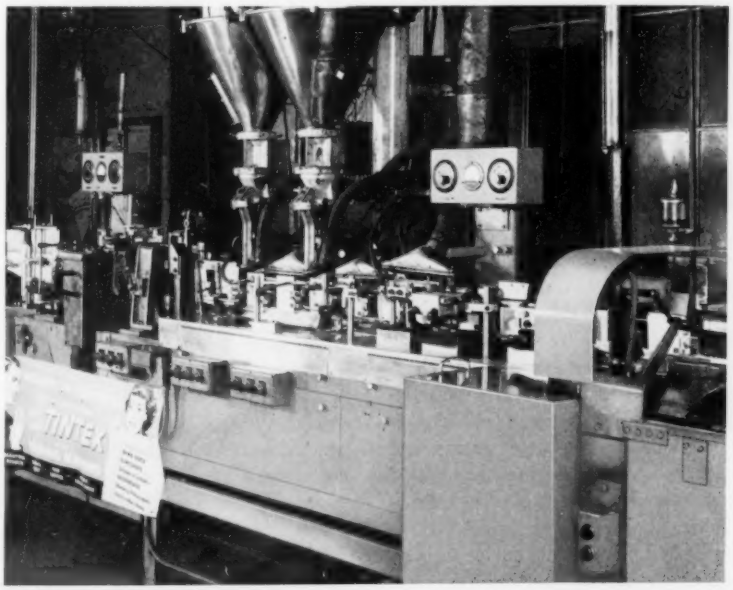
### Completing Of Packages

Once the printing takes place, the web moves through the balance of the forming, filling, and sealing action. There is a double bar seal; a vertical slitter cuts through the vertical seal, thus separating individual packages from the web. This is an intermittent action because a suitable heat seal appears unattainable in the light of our equipment and operation without such an action.

Incidentally, we have two fillers and do double place filling. Half of the contents of each pouch goes in from each filler. The trouble is that there may be an override or underride on the auger discharge. There is more variation where there is just one filler than where there are two. Thus, we can control our fill more closely by providing a split-filling operation.

The result of our installation is that we form, print, fill, and seal

*(Continued on Page 55)*



**Following** the printing action, the web moves through the forming, filling, and sealing operations. These take place at 120 packages a minute. By having two fillers, half the contents of each pouch goes in from each. This assures closer control of fill — there is more variation (due to override or underride on auger discharge) with one filler than with two.

**W. L. Romney** is a graduate of Yale University's Sheffield Scientific School with a B.S. degree in administrative engineering. He has been associated with the Procter & Gamble Company ever since. He is a past vice president of American Management Association's packaging division and has been a member of its packaging planning council for a number of years. He is a member of Packaging Institute.

*Today's trend to increasingly higher packaging line speeds places a special burden on the producers of packaging materials — for example, folding cartons. Mr. Romney outlines here some basic factors contributing to effective cartoning at high speeds. He also stresses the user's responsibility in helping his suppliers produce suitable cartons. His views merit the attention of anyone concerned with the difference between good cartons and mediocre ones for high-speed packaging.*

# What high speeds demand of folding cartons

**By W. L. Romney,**
**Technical Director of Packaging, The Procter & Gamble Company, Cincinnati**

Anyone seeking to grasp the subtleties of folding carton requirements for high-speed operation (1) must understand the special problems of high speed itself and (2) must realize that satisfactory cartons depend on the closest kind of teamwork between package users and carton manufacturers. Proceeding from these premises, he then can master the intricacies of high-speed carton requirements — demands never encountered in manual or low speed cartoning.

No one familiar with the contemporary packaging scene doubts that high speed is here to stay and that its use is becoming increasingly widespread as time goes on. Technological progress provides equipment and methods conducive to ever-rising speeds. Further, the basic economics of production — expenses of operation and capital outlay — make it abundantly clear that effective use of high-speed packaging represents a distinct contribution to lower costs.

If we are to hold our over-all packaging costs constant or improve them in the face of rising labor and material costs, there is only one thing to do: Reduce the man hours per unit of production. If we can turn out more packages with the same people during the same time interval, we have a chance of maintaining the status quo even as labor and materials costs go up.

Further, high-speed operation gives you an effective brake on capital expenditures. Faster packaging lines mean more effective use of existing space and facilities. Turning out decidedly more production with the same plant means you have a distinct saving in buildings you do not build and in facilities you do not need. In short, the question of capital is one of the major driving forces impelling us all to higher and higher speeds.

## High Speed: Pro And Con

There is nothing new about high speed and its underlying principles. The increase of the hourly wage rate of most workers probably provides the best incentive management can have toward the installation of higher speed equipment. Today's labor costs make it possible to justify machines that a few years ago could not be justified in terms of such costs.

But there is a lot more involved than merely ordering a battery of high-speed packaging line equipment and starting operation with it. The mere purchase and installation of such machinery falls far short of being the key to cost reduction. In fact, it can be a distinct liability in the hands of an unsophisticated plant management and operating group. You must know how to use it proper-

ly and you must be aware of the problems and responsibilities accompanying such stepped-up operation.

At the same time, it is important to avoid being discouraged by the host of factory and operational problems that appear with the initial use of high-speed machinery. Many questions arise concerning the suitable training of packaging line workers. It is usually necessary to upgrade the skills of mechanics and other specialists working along the lines. People and skills that were never considered necessary to low speed or manual operations suddenly become imperative.

### Carton Itself All-Important

No matter how realistically one adjusts to the niceties of high-speed operation and no matter how efficient your machinery and personnel may be, the all-important factor is the carton itself. Inadequately manufactured cartons can negate the effectiveness of the finest machinery and the most capable of attendants.

In typical progressive organizations, the entire packaging operation is geared to time. You package against time and you avoid overpackaging in order to avoid furnishing protection for an unnecessarily long time. Numerous other time factors appear — such as delivery and production schedules, specific warehouse and store shelf life requirements, and the special difficulties of seasonal products.

In order to adjust more effectively to these time factors, you must have completely dependable production lines and facilities capable of meeting schedule deadlines. In order to avoid having excessive inventories (as well as to avoid running short of production), you must have confidence in your consistent ability to operate packaging machinery at, say, 95% efficiency. This dependability is essential to accurate prediction of the time factors.

You have your machinery and your personnel within your own plants. Further, to have all these function properly, you must rely absolutely on packaging materials in order to meet your production needs. The emphasis on reliable packaging materials is nowhere more strongly shown than in the case of folding cartons used in high-speed operations.

### Basic Carton Requirements

There are two basic requirements for such a carton: (1) Precision of manufacture and (2) uniformity of manufacture. It is evident that as machine speeds and motions increase, the machine parts have to be made to closer tolerances and with increasingly precise production — or the equipment would fall apart. There is a corresponding need of accuracy and exactness of manufacture in the cartons going through such packaging machinery.

The starting point of carton consideration is the supplier himself. Do his plants have equipment capable of meeting the exacting requirements of high-speed cartons? You cannot expect miracles of antiquated equipment never intended to produce cartons for high-speed usage. An obvious illustration is the control of registration. The human eye is no match for a photoelectric control. This and similar tools of production are becoming increasingly evident on fabricating equipment.

Assuming that a supplier has equipment capable of doing a precise and uniform job of carton production, the next consideration is the board itself. This focuses attention on performance requirements such as rigidity. The carton board must be rigid and strong enough to withstand the rigors of feeding and folding at high speeds. At the same time it must have bending properties adequate to prevent score cracks when opened.

Another vital consideration is the ability of the stock to glue rapidly. You must have the closest kind of relationship between the absorption of the board taking the glue and the time in which you have to do the gluing job. This means you must have board with water penetration within specific limits. These requirements relate to corollary situations such as the advantageous use of heat or having the sealing belt long enough to do the job.

### Basic Need: Teamwork

Having a supplier with adequate fabricating equipment as well as board suitable for making cartons destined for high-speed operation, our attention turns to the converting operation itself. This is the most important step of all because it emphasizes precision of manufacture so vital to producing cartons that meet the needs of high speed.

This in turn emphasizes one of the most basic factors of the user-supplier relationship: It is absolutely necessary to have a teamwork relationship. The user must work actively with his carton manufacturer. In turn, the carton manufacturer must know exactly what the user wants. There is joint responsibility for this mutual exchange of information. It is in no sense a one-sided arrangement.

We, as users, must communicate to our carton producers just exactly what we need and why. We cannot expect any carton manufacturer to do it all and to interpret our requirements for us. For example, samples of cartons from a previous run and some vague instructions accompanying them are not enough. It would be better to have an accurate blueprint supported by general specifications establishing just what you need.

You should design your blueprint so that if cartons are made consistently as specified by the blueprint, you have the best chance of getting an efficient c a r t o n i n g operation. Similarly, if you have a supplier who meets your blueprint as set forth, he is approaching perfection. It should be virtually a Bible to him; it enumerates and covers the vital items. For example, it should call attention to such things as these: (1) Size and style; (2) score pre-breaking requirements; (3) location of printing; (4) character of score; (5) grain direction; (6) details of special features such as opening and pouring devices; (7) allowable tolerances for the above.

### Proper Follow-Up Vital

But specifications and blueprints are no guarantees of a good carton. All they do is fulfill the obligation of

the user to make his needs known to the carton supplier. From this point on the manufacturer of cartons must learn to use these guides properly. Obviously the user must follow up to be sure these requirements are being met. Adequate controls and inspection of incoming packaging materials are evident needs. High-speed operations place particular burdens on adequate quality control, sampling, and package inspection techniques.

The greatest opportunities for success in getting the cartons you want rest in continuity of teamwork with your supplier. We, as users, are not free of responsibility to help our suppliers understand our needs. It is not as simple as writing a specification, placing an order, and sitting back to await a miracle. Specifications fall far short of being all-inclusive.

While specifications represent a means of communicating vital information, they cannot hope to convey the fine points of know-how that spell the difference between success and failure — between cartons that perform efficiently on high-speed lines and those that don't. You simply cannot specify know-how.

However, there are many things you can do advantageously. You can invite your supplier to send his key people to see your operation firsthand. We do this and we find it a very effective procedure. Such efforts help the supplier do a good job. All this merely emphasizes that the user must take the initiative. He cannot simply dismiss his specifications upon forwarding them to the supplier without seeing that they are understood. He may find that he has a selling job to persuade the supplier to carry out these requirements, and obviously he should never specify requirements without a good reason for them or without some advantage that inures to his operation.

### Build Mutual Confidence

A parallel example of the close cooperative relationship necessary is what we find in well-managed companies: Mutual confidence and respect between those responsible for the technical packaging function and those who carry out the specific job of actual purchasing. The packaging experts spell out the subtleties of package requirements necessary to meeting a particular need. They judiciously confine their efforts to technical helpfulness within their own sphere and do not inject themselves into the technique of purchasing. Similarly the buying experts confine their efforts to their chosen field, concentrating on the job they can do best (that of actual buying) and leaving to the packaging people the spelling out of technical and operational requirements.

Exactly the same philosophy applies to the user-supplier relationship. The same friendly, cooperative approach which buyers and packaging experts within a company practice is also applicable to your dealings with outside suppliers.

But the basic thing is that you go above and beyond the call of duty to get your story across to your suppliers. There are many visual and educational means to use. Movies and slides contribute greatly to the education of one's suppliers. A high speed camera is extremely helpful. It creates a lot of interest because it permits illustrating a sequence such as the carton closing operation and showing it in such a way that the supplier personnel can see just what happens to the carton and can understand why certain requirements are there.

### Two-Way Education

At the same time you are so carefully showing your carton manufacturers just what goes on within your packaging machinery and just what happens to their cartons, you are also giving close attention to your specifications. Often the educational process of spelling out requirements to the suppliers proves a useful means of teaching the user's own personnel just what is done about high-speed problems.

For example, it took a lot of experimentation to learn just how to pre-break carton scores and just what to specify. The pre-breaking of scores is a direct manifestation of high speed. Before pre-breaking was common, machine difficulties were common because cartons resisted the feeding mechanism. Scores were too stiff. As users learned more and more about their own operations, they were able to state accurately such requirements to suppliers. These details are absolutely vital if one is to maintain high efficiency on the packaging lines.

And so, we find ourselves face to face with the inevitable trend of higher and higher speeds.

As important as precision and uniformity of manufacture are, they are after all just words unless you can make them mean something. Good teamwork between user and supplier is a good way to make these words mean something. Without this teamwork and the exchange of know-how and confidence, no high-speed packaging operation can succeed.

**Carton buying no easy task**

Anyone who questions Mr. Romney's emphasis on making certain the carton supplier understands exactly what the user wants should analyze the experience of plants reporting difficulty in getting proper cartons. How many users are absolutely certain that carton manufacturers (not just the salesmen, but also the people who actually make the cartons) know just how the cartons are formed, filled, and sealed on the packaging lines? There is no substitute for an adequate interchange of plant visits. This is true follow-through on buying specifications.

**A. R. Nielsen** is a graduate of Trinity College (Connecticut) with a B. S. degree. Associated with Plax since 1944, his chief interests have been the study of permeability and development of low permeability and protective plastic coatings. Mr. Nielsen is a member of American Chemical Society and Society of Plastics Engineers.

**E. J. Temple** is a graduate of Yale University with a B. E. degree in chemical engineering. He served in a variety of positions in the production department of Plax prior to joining its technical sales organization in 1952. He served with the Army Chemical Corps Materiel Command during the Korean incident.

# Permeability of Plastic Bottle Materials

By A. R. NIELSEN, Research Chemist,
and E. J. TEMPLE, Technical Sales Engineer,
Plax Corporation,
Hartford, Connecticut

**Here is a review** *of the permeability characteristics of various plastic bottle materials using twelve different chemicals to illustrate the main factors contributing to permeation rates. This review of ten polymers reported shows that each thermoplastic bottle material has its own characteristic permeability properties and that the influence of various factors in the permeation process differs considerably from resin to resin. Although the quantitative data reported can aid in selecting a particular plastic material, the authors stress the importance of thorough study of the actual product in such plastic packages as a basis for final decision.*

Since the commercial introduction of the plastic squeeze bottle slightly more than ten years ago, much work has been done on the permeability properties of the polyethylene materials used in bottle manufacture.[1] Although bottles have been produced of many other plastics, including polystyrene, cellulose acetate, cellulose acetate butyrate and monochlorotrifluoroethylene, their use has been limited and very little data have been published on their properties.

In the past few years, new polymeric materials which lend themselves to bottle blowing techniques have become available and the family of polyethylenes has been expanded. To use these effectively, new and improved blowing equipment has been developed. With these advances, it now becomes practical and economical to think of packaging a much wider range of products in a variety of plastic containers.

*Selection of test chemicals.* To the manufacturer and user of such plastic containers, a knowledge of their permeability characteristics is of prime interest. The twelve chemicals included in this report were selected to illustrate the main factors contributing to the permeation rate.

In brief, permeation is considered a three-step process: (1) Solution of the permeant molecule into the container wall; (2) diffusion of the permeant through the container wall to the outer surface; and (3) evaporation of the permeant from the outer surface of the container.

Prior studies have shown that the rate of this process in a particular resin is determined by such factors as polarity, size, and shape of the permeant molecule.

Variables of each of these factors are represented in the following list:

| Name | Formula | Molecular Weight |
|---|---|---|
| 1. Water | HOH | 18 |
| 2. Methanol | $CH_3OH$ | 32 |
| 3. Glacial acetic acid | $CH_3COOH$ | 60 |
| 4. Ethyl acetate | $CH_3C(=O)OCH_2CH_3$ | 88 |
| 5. Methyl Ethyl Ketone | $CH_3C(=O)CH_2CH_3$ | 72 |
| 6. N-butyl ether | $(CH_3CH_2CH_2CH_2)_2O$ | 130 |
| 7. n-heptane | $CH_3(CH_2)_5CH_3$ | 100 |
| 8. Mineral oil | $CH_3(CH_2)_XCH_3$ | --- |
| 9. Toluene | | 92 |
| 10. Dipentene | | 136 |
| 11. Turpentine | ---- | --- |
| 12. Carbon tetrachloride | $CCl_4$ | 152 |

These chemicals are listed in the approximate order of decreasing polarity, with the polar molecules, water and methanol, at the top and the non-polar molecules at the bottom. Examples of aliphatics, aromatics, acids, esters, ethers, and ketones are used to test the effect of molecule composition and configuration.

Heptane, a straight chain aliphatic, and mineral oil, which is essentially a mixture of straight chain hydrocarbons of high molecular weight, represent variables of molecule size within a single chemical family. Difference in size and configuration can also be noted by comparison of toluene, dipentene, and turpentine, a mixture of aromatics. Carbon tetrachloride is representative of the halogenated hydrocarbons.

In some instances, as circumstances in the laboratory required, the list of test liquids was altered slightly, i.e., benzene in place of toluene, acetone in place of methyl ethyl ketone, hexane or decane in place of heptane, shown indented on the chart.

The chemicals chosen for testing are commercial grades obtained from usual supply sources. However, the best grade offered was generally selected.

These chemicals do not by any means represent all types of compounds, but for limited testing they have proved most useful and should offer something of interest to those contemplating the use of plastic containers.

*Description of plastic resins.* There are, of course, hundreds of thermoplastic materials and formulations which have been considered for use in bottle production. Ten of the many plastics which can be molded on existing equipment and show some potential for commercial application will be considered here. The first five of these are polyethylenes (non-polar), demonstrating the variations in resins which can be achieved with the latest polymerizing methods. The other five include two nylons, two vinyls, and a chlorinated polyether (all polar).

*Polyethylene A — Bakelite Company, mean density — 0.92.* This is one of several standard "low density" polyethylenes produced by the high pressure process and is presently used for the familiar "squeeze" bottle.

*Polyethylene B (Irradiated Polyethylene A).* Irradiation of polyethylene is done to obtain cross-linking of the polymer. In the sample chosen, irradiation of Polyethylene A was accomplished by electron bombardment at High Voltage Corp., Cambridge, Mass., with a dosage of 26 megareps. It is used here to compare permeability values of an irradiated and non-irradiated base polymer.

*Polyethylene C — DuPont, mean density — 0.92.* Another of the "low density" polyethylenes widely used for blown bottles. This polymer exhibits a lower degree of side chain branching and higher crystallinity than Polyethylene A.

*Polyethylene D — DuPont, mean density — 0.93.* This is an "intermediate" polyethylene produced by the high pressure process. Temperature resistance is better than standard low density polyethylenes.

*Polyethylene E — Phillips Chemical Company, mean density — 0.96.* Represents the "high density" polyethylenes made by the low pressure process which have become commercially available during the past year or two. This group has the highest density and crystallinity in the polyethylenes making it potentially important to the packaging field.

*Nylon F — DuPont, "66 type".* This is a high molecular weight extrusion grade of the standard nylon, used widely in the United States. Because of its physical and chemical properties it is being seriously considered for the blowing of aerosol containers.

*Nylon G — DuPont, "66 type" plasticized.* A plasticized form of the "66 type" nylon is included to show the effect of plasticization on permeability properties.

*Polyvinylchloride H — Abbey Plastics Corp. — rigid formulation.* The formulation selected has 13 parts plasticizer to 100 parts resin. The vinyls are of interest to bottle producers because they offer an opportunity to select specific physical and mechanical properties to suit the end-use.

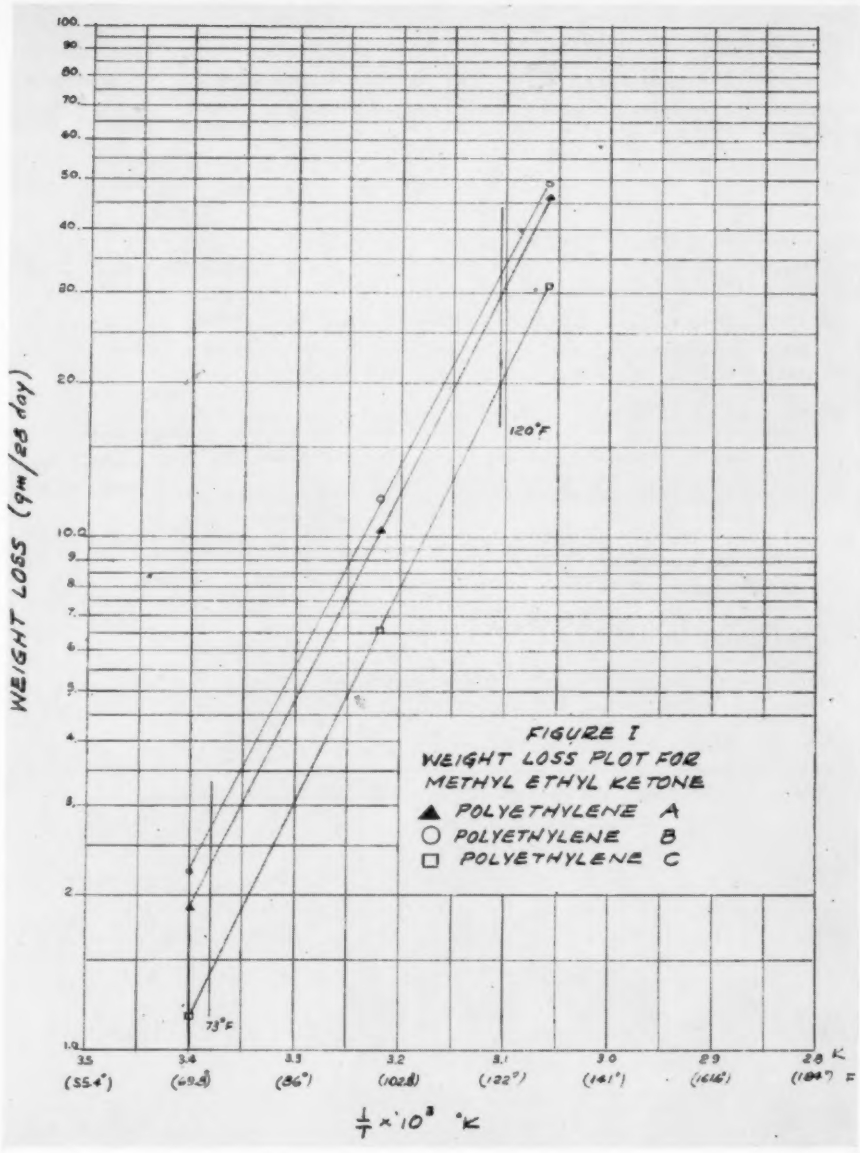
*Polyvinylchloride K — Abbey Plastics Corp. — flexible formulation.* Representing the flexible varieties of vinyls is this formulation containing 22 parts plasticizer to 100 parts resin.

*Polyether L — (chlorinated) — Hercules Powder Company.* A material released to the industry only recently. It has a chemical structure completely different from the other materials included here.

*Explanation of Table I.* The data presented on this table on the ten materials selected were drawn from a continuing study of permeability conducted over the past three years.

The procedure employed for this work was the standard Plax shelf life test described in earlier reports by Messrs. Pinsky, Nielsen, and Parliman[1]. All tests were made in Plax 4-ounce Boston Round bottles of approximately 16½ to 17½ gram weight. The data in general are based on triplicate tests.

The weight change of filled test bottles was observed at temperatures of 73° and 120°F for the first 28 days of testing and from these data, yearly percentage weight




losses (or gains) for the 4-ounce size were computed. Permeation Factors ($P_t$)* were calculated on the 4-ounce bottles but are applicable to any size. The yearly weight change calculations are actually estimates based on the assumption that the rate of weight change remains constant during this period.

Reports referred to above indicate that over a full 12-month test period, the rate of weight change tends to decrease. Thus, the computations in general give a "conservative" figure or, in other words, the maximum change which might be expected under controlled conditions. This straight line extrapolation of the 28-day data explains the presence in the table of percentage weight losses of over 100%.

Tests on the three low density polyethylenes (A, B, and C) were conducted as part of a U. S. Air Force research project [2] at 70°, 100°, 130°, and 165°F. Test temperatures of 73° and 120°F were used in later work to conform more closely with general industry practices. Thus, it became necessary to interpolate the earliest polyethylene data to make a comparison with the later tests. It was found that the best way to accomplish this was to plot the common logarithm of the actual permeation losses in grams versus the inverse of absolute temperature for each combination of chemical and bottle material involved. Experience has shown that the points plotted

*Permeation Factor — Gms/24 hrs/100 sq. in./.001" thickness at stated temperature.

## TABLE I — PERMEABILITY OF TEN SELECTED POLYMERS
(Based on weight change in 4-oz. Plax Boston Round Bottles)

| Permeant | | Polyethylene Resins | | | | | | | | | | Nylon Resins | | | | Vinyl Resins | | | | Polyether Resins | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Polyethylene A d. 0.92 | | Polyethylene B Irradiated d. 0.92 | | Polyethylene C d. 0.92 | | Polyethylene D d. 0.93 | | Polyethylene E d. 0.96 | | Nylon F Non-plasticized | | Nylon G Plasticized | | Vinyl H Rigid | | Vinyl K Flexible | | Polyether L Chlorinated | |
| | | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F | 73°F | 120°F |
| Water | % | 0.27 | 4.9 | 0.20 | 5.3 | 0.18 | 3.8 | 0.08 | 4.42 | Y | 3.03 | 9.54 | 129.8 | 46.3 | 426.0(7) | 1.53 | 11.5 | 4.67 | Z | 0.04 | 3.27 |
| | Pf | 0.16 | 2.87 | 0.12 | 3.06 | 0.11 | 2.26 | 0.05 | 2.40 | | 1.59 | 4.30 | 58.6 | 25.2 | 222.0 | 0.73 | 5.5 | 1.85 | | 0.02 | 1.43 |
| Methanol | % | 2.8 | 36.3 | 3.2 | 39.8 | 3.1 | 21.1 | 1.59 | 29.9 | 0.5 | 12.6 | 120.0 | 1094.0 | solvent attack | | 3.73 | 19.3 | 15.6 | Z | 1.62 | 15.85 |
| | Pf | 1.28 | 16.6 | 1.47 | 18.2 | 1.44 | 9.8 | 0.60 | 12.26 | 0.21 | 5.25 | 38.1 | 407.0 | | | 1.35 | 6.95 | 4.9 | | 0.54 | 5.68 |
| Acetic acid | % | 6.46 | 72.3 | 7.67 | 78.9 | 3.88 | 46.1 | 2.8 | 35.8 | 1.8 | 10.9 | — | — | — | — | — | — | — | — | — | — |
| | Pf | 3.76 | 42.1 | 4.46 | 45.9 | 2.32 | 27.5 | 1.66 | 20.9 | 0.97 | 5.96 | | | | | | | | | | |
| Ethyl acetate | % | 54.5 | 515. | 70.2 | 652. | 33.8 | 388. | 20.4 | 362. | 9.8 | 95.3 | 0.16 | 4.20 | 5.61 | — | solvent attack | | solvent attack | | 272.0 | 955.0 |
| | Pf | 27.7 | 262. | 35.7 | 332. | 17.6 | 253. | 9.48 | 167. | 4.53 | 42.8 | 0.07 | 1.76 | 2.61 | — | | | | | 100.8 | 426.0 |
| Methyl ethyl ketone | % | 30.5 | 403. | 38.1 | 430. | 19.6 | 264. | — | — | — | — | 0.22 | 5.14 | — | — | — | — | — | — | — | — |
| | Pf | 14.0 | 185. | 17.5 | 198. | 9.2 | 124. | — | — | — | — | 0.09 | 1.76 | — | — | — | — | — | — | — | — |
| Acetone | % | | | | | | | 8.27 | 114. | | | | | | | | | solvent attack | | 702.0 | empty 14 days |
| | Pf | | | | | | | 3.42 | 51. | | | | | | | | | | | 237. | |
| n-Butyl ether | % | 256. | 1980. | 313. | 1900. | 139. | 1345. | 87.3 | 1083.(21) | 55.5 | 283. | 0.41 | 8.83 | 0.44 | 17.47 | — | — | 54.1 | Z | 0.2 | 5.02 |
| | Pf | 112. | 867. | 143. | 830. | 62. | 601. | 34.8 | 427. | 21.1 | 112. | 0.15 | 3.34 | 0.19 | 6.57 | — | — | 16.8 | | 0.08 | 1.68 |
| n-Heptane | % | 760. | 5600. | 832. | 4880. | 452. | 5150. | 412. | 2609.(14) | 148. | 670. | — | — | — | — | — | — | 0.55 | 6.02 | — | — |
| | Pf | 303. | 2230. | 332. | 1940. | 176. | 1290. | 139. | 900. | 52.2 | 275. | — | — | — | — | — | — | 0.16 | 1.76 | — | — |
| n-Hexane | % | | | | | | | | | | | 0.94 | 23. | | | 0.86 | 13.3 | | | | |
| | Pf | | | | | | | | | | | 0.32 | 7.8 | | | 0.27 | 4.15 | | | | |
| n-Decane | % | | | | | | | | | | | | | 1.12 | 10.7 | | | | | 0.45 | 1.72 |
| | Pf | | | | | | | | | | | | | 0.42 | 3.89 | | | | | 0.15 | 0.56 |
| Mineral Oil | % | — | — | — | — | — | — | — | — | +0.03 | 0.74 | 0.169 | 3.43 | — | — | | | — | — | +0.22 | 0.74 |
| | Pf | — | — | — | — | — | — | — | — | X | 0.34 | 0.074 | 1.91 | — | — | | | — | — | X | 0.29 |
| Toluene | % | — | — | — | — | — | — | 522. | 4230.(7) | 270. | 1110. | 1.38* | 19.2 | 3.83 | 39.1 | — | — | solvent attack | | 70.1 | 552. |
| | Pf | — | — | — | — | — | — | 220. | 1778. | 118.3 | 496. | 0.57 | 7.9 | 1.76 | 16.6 | — | — | | | 25.2 | 212. |
| Benzene | % | 990 | 7990. | 1075. | 7150. | 638. | 4850. | | | | | | | | | | | | | | |
| | Pf | 494. | 3980. | 535. | 3570. | 327. | 2480. | | | | | | | | | | | | | | |
| Dipentene | % | — | — | — | — | — | — | 93.2 | 1380.(7) | 59.5 | 316. | 0.52 | 6.43 | 1.53 | 12.15 | | | 18.8 | 95.9(14) | Y | 1.93 |
| | Pf | — | — | — | — | — | — | 40.8 | 607. | 25.6 | 136. | 0.21 | 3.60 | 0.66 | 5.17 | | | 6.45 | 33.4 | Y | 0.71 |
| Turpentine | % | 151. | 1730. | 165. | 1536. | 76.2 | 930. | | 363. | 7.7 | 113. | — | — | — | — | 0.42 | 1.84 | — | — | +0.08 | 1.92 |
| | Pf | 74.5 | 854. | 80.3 | 745. | 38.6 | 471. | | 181. | 3.58 | 51.1 | — | — | — | — | 0.17 | 0.71 | — | — | X | 0.76 |
| Carbon tetrachloride | % | — | — | — | — | — | — | 304. | 3710.(7) | 118. | 766. | 0.67 | 15.7 | 1.63 | 24.5 | — | — | 201.+ | Z | 1.41 | 30.9 |
| | Pf | — | — | — | — | — | — | 220. | 2523. | 98.6 | 637. | 0.55 | 12.9 | 1.13 | 17.8 | — | — | 117.2 | | 0.67 | 15.4 |

1. Percent (%) represents yearly loss in four-ounce bottles only. 2. Pf = grams/24 hrs./100 sq. in./.001" thickness at specified temperature. 3. Numbers in parenthesis specify length of test in days if less than normal 28; Thus (7) = 7 days. 4. X = Not applicable; data not given. 5. Y = No significant change. 6. Z represents those cases in which it was impossible to maintain effective cap seal at temperature indicated. 7. * Based on one bottle; closure not maintained on duplicates.



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fall on a straight line (Fig. 1). From this, it is possible to obtain values at temperatures of interest.

*Analysis of data.* From the limited amount of data presented here several generalizations can be made on the permeability characteristics of these materials. Consider first the five polyethylenes reported. It is noted immediately by comparing Polyethylenes A and B that the result of irradiation has been a general increase in permeability of the polymer. As temperature increases the permeation factors of the two plastics begin to approach each other, and in three cases at 120°F, the irradiated polymer is less permeable. Water appears to be an exception to the general pattern, but the differences shown are very slight.

A check of the data for Polyethylene C indicates a definite superiority to the two previous formulations in its barrier properties. Reductions in weight losses of up to 50% are noted. This improvement is attributed to the higher crystallinity of the polymer which results from the lower degree of side chain branching.

With the higher density polyethylenes (Polyethylenes D and E) a general tendency for reduction in permeability is noted as the density of the polyethylene increases. Tied in directly with the higher density, of course, is an increase in crystallinity which affects diffusion of the permeating molecules through the bottle walls. In general, Polyethylene D exhibits lower permeability rates for each of the liquids tested than do the first three polymers. Reductions in permeation are even more obvious with the high density Polyethylene E. These rates are about ½ to ⅛ those of Polyethylene A, although turpentine shows an even greater reduction.

**Support general rules.** The five polyethylenes, as a group, contribute additional support to the general rules of permeability which have been defined previously[1]. In these non-polar resins, chemicals of relatively high polarity, such as water and methanol, exhibit low permeation rates. On the other hand, the essentially non-polar materials, turpentine for example, continue to show excessively high rates of permeation even with the high density resins.

A comparison of the weight losses of the straight chain hydrocarbons, heptane and mineral oil, gives an indication of the effect of permeant molecule size. Whereas the relatively small heptane molecule permeates at a rate of 275 at 120° in Polyethylene E, the larger mineral oil molecules are in effect blocked from diffusion and we find a comparable permeation rate of 0.34. This same pattern is evident in the relative rates of toluene and dipentene.

Table I also compares an aliphatic with a corresponding aromatic hydrocarbon. In both Polyethylenes D and E the 7-carbon aromatic, toluene, shows higher permeation than the aliphatic, heptane. This evidence, combined with similar data collected in other experiments, demonstrates the importance of molecular configuration in the permeation phenomenon.

**Need for new materials.** All of these points lead to the conclusion that the intermediate and high density polymers as well as those of low side chain branching have expanded the variety of products that can be successfully packaged in plastic containers by bringing the permeation factor within commercially acceptable limits. However, when the less polar materials are examined, it becomes obvious that materials other than presently available polyethylenes are needed if products containing simple ethers, esters, aliphatics, and aromatics are to be packaged in plastic containers.

Nylons, vinyls, and polyethers may fill in some of the gaps. Table I indicates that Nylon F offers good barrier properties for many of these chemical families. Low permeability values are found for the permeants at the low-polarity end of the list and higher values with the more polar alcohol and water. In fact, if the decision were based only on permeation rate, Nylon F would be acceptable for most commercial applications of the test chemicals except the methanol and water.

The plasticized Nylon G in every test case, shows a higher $P_f$ than the non-plasticized nylon. For water and ethyl acetate, the difference in rate is more obvious than for the other permeants. Despite this general rise in permeability, Nylon G is still worthy of interest for ethers, aliphatics, aromatics, and halogenated hydrocarbons.

**Note solvent attack.** Also with this plasticized resin the first mention of solvent attack is noted — in this instance with methanol. Experience over the years has established that solvent attack is very rare with polyethylene, but it becomes a matter of definite concern with many of the other thermoplastics.

The two vinyl resins H and K are entirely different in their properties from the other groups of polymers studied. Both have water and methanol permeability rates lower than the nylons but higher than the polyethylenes. The water and methanol data also confirm the trend towards higher permeability rates with more plasticized, flexible resins seen with nylon.

Note that in this instance the permeation factors are two to four times higher for Vinyl K. Again with Vinyl K, solvent attack is found, but this time with the ester, ketone, and simple aromatic test chemicals rather than the methanol. However, the figures for the straight chain hydrocarbons, hexane and mineral oil, and for turpentine are quite encouraging.

Because of the amazing variety of plasticizers and resin combinations offered by suppliers, it is impossible to generalize the characteristics of the vinyls on the basis of a few specific formulations.

Chlorinated polyether (Polyether L) presents some interesting contrasts to what has been seen with the other polymers. First, it is noted that the permeation rates of water and methanol are low. At the other end of the scale, low permeation rates also are found with the low-polarity compounds.

In addition, there is an unusual disparity between the permeation rate of toluene (25.2 at 73°) and that of the higher molecular weight dipentene (no measurable change

*(Continued on Page 54)*

**S. F. Brockington** is a graduate of the University of Saskatchewan with B.S. and M.S. degrees. Associated with Quaker Oats since 1934, he was initially chief chemist at its Saskatoon plant, later joined the research unit of the company — holding various positions therein. He has authored articles in technical publications of his field. He is a member of American Association of Cereal Chemists, the Institute of Food Technologists, and Packaging Institute. He is a Fellow of the Chemical Institute of Canada.

*Those who make technical and operational packaging decisions frequently are concerned with the transfer of odor and flavor from, to, and through packaging materials. In reviewing some basic phases of this problem, Mr. Brockington suggests that odor and flavor transfer is not as complicated a subject as is commonly believed. His approach to a solution stresses the recognition of the value of an individual's nose and palate in odor-flavor testing. The bibliography appearing at the conclusion of his text lists 64 pertinent literature references and should be of incalculable help to anyone concerned with odor and flavor transfer.*

# Taking a "new look" at our odor, flavor transfer problems

**By S. F. Brockington,**
**Section Leader, Quality Standards,**
**Research Laboratory,**
**The Quaker Oats Company,**
**Barrington, Illinois**

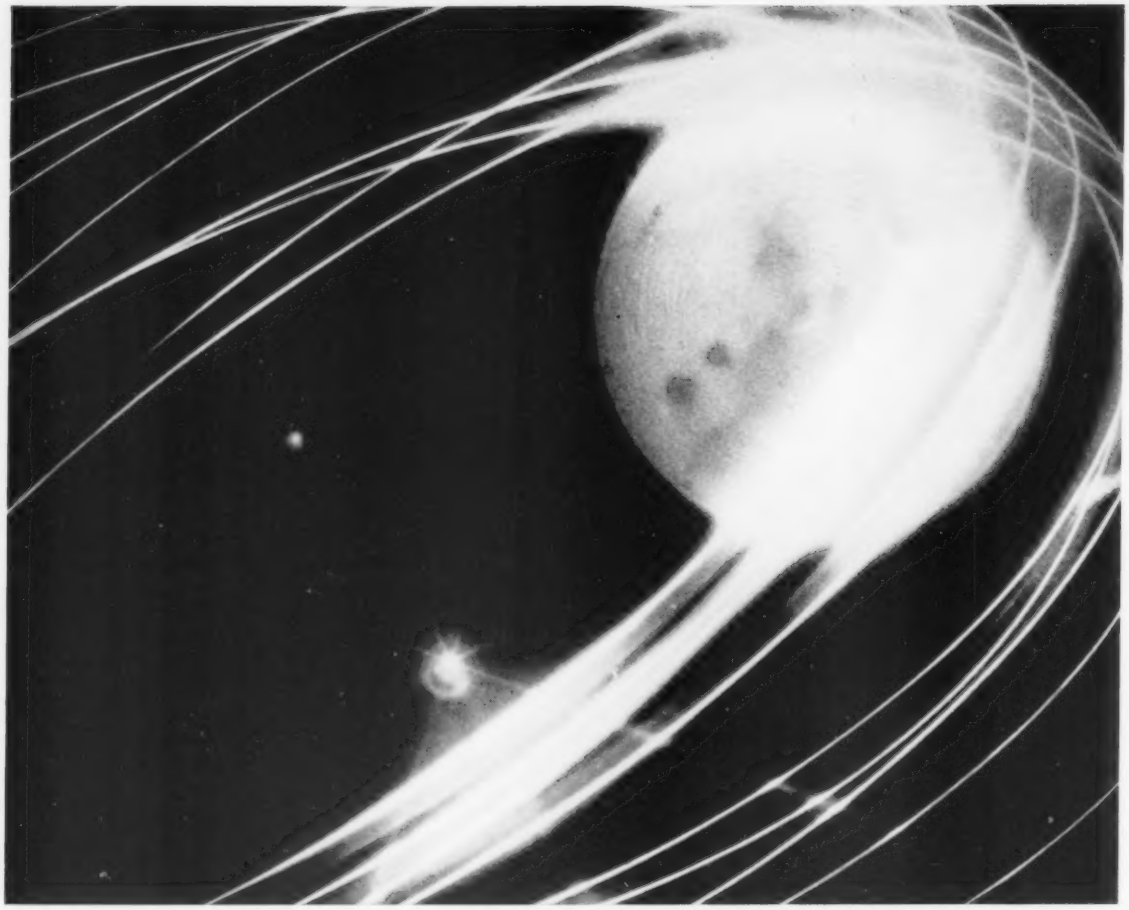
The time is here to take a closer look at the problems of odor and flavor transfer and their relationship to packaging materials. As the package-product relationship becomes increasingly critical, it is important to capitalize on every resource contributing to the solution of such transfer problems. Perhaps more on the basis of investigation rather than of quality control per se there is a challenging problem before those who are delving into odor and flavor detection. In any event, it is necessary to: (1) Establish the problem; (2) determine an appropriate methodology; and (3) apply it to packaging materials specifically.

These problems have been with us a long time and there is an abundance of literature on test methods, detection procedures, and the like. But this very proliferation suggests the need of taking a closer look at some of the *basic* phases of the question.

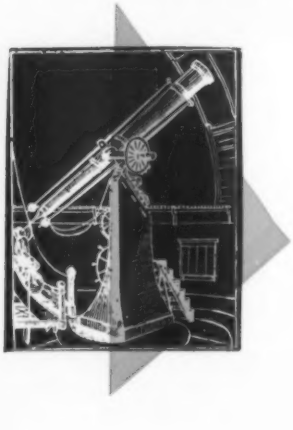
Above all, we should not overlook the value of our noses and palates as effective instruments of odor and flavor detection. In spite of the best available mechanical or instrumental detection means, we have nothing that is more sensitive than our noses and palates. They can unquestionably detect parts per million and probably parts per billion. No mechanical device can do anything like this. However, a basic stumbling block to capitalizing on these human faculties for the study of odor and flavor with regard to packaging materials is the inherent mental resistance of most people. Individuals frequently tell us they are not good sniffers and do not do a good job of flavor detection. Often the very reverse is true. We frequently find that such individuals are extremely good at sensory perception.

The important point in the systematic use or application of the nose or palate of an individual either alone or in a taste panel is this: We must make him willing to train himself. Once we can make such people affirmatively interested in such efforts, we can go ahead with the program.

Further, we need not confine our efforts to people working in technical capacities. Those handling packaging materials at all stages of the operation should be alerted to odor and flavor detection. Sometimes men handling incoming packaging materials on the receiving dock are quick to spot foreign odors. We need



# ARE CROWN MULTIWALLS REALLY SUITABLE FOR SPACE TRAVEL?



The problem of how best to ship mortar-mix to Mars may very well confront packaging experts in the next decade or so. When that time comes, will Crown Multiwalls be the ideal container for the job? Will they be meteor-resistant? Can they withstand blast-off?

We're not trying to answer these questions—yet. Frankly, we're too busy assuring the bright future of Crown Multiwalls in *other* ways.

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To keep abreast of new manufacturing concepts and new packaging ideas, Crown Zellerbach is constantly modernizing and improving its facilities.

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to capitalize on their native abilities with their noses and palates alike.

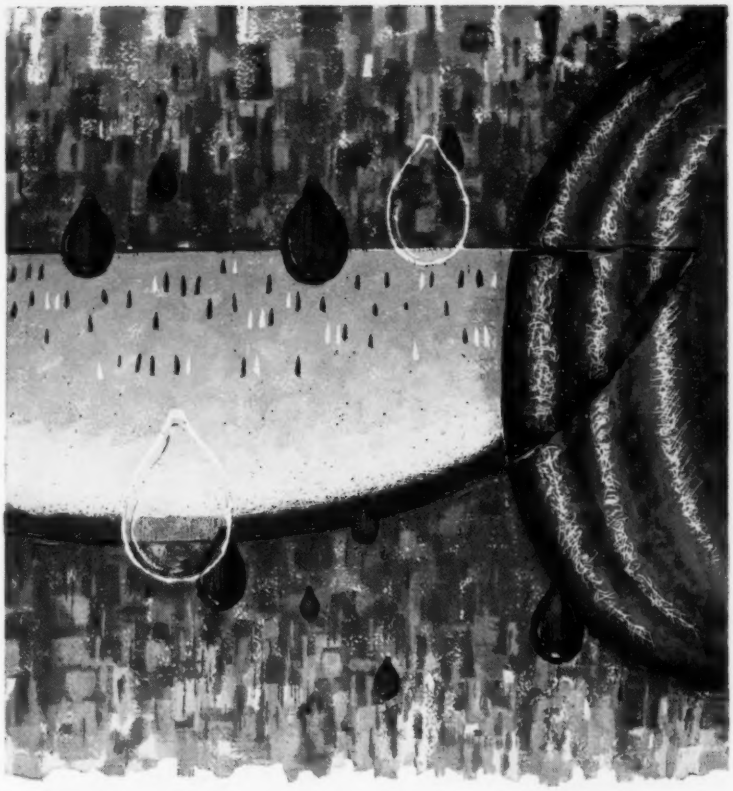
### Sources Of Odor, Flavor

A typical situation calling for odor-flavor transfer investigation is that of an odor transfer often coming from small amounts of substances in the packaging materials themselves. There may be residual amounts of plasticizers, solvents in plastic materials, and trace materials in paperboard. For example, in a film there may be mercaptans in very small concentrations. The difficulty lies in locating the sources.

Important to the solution of the problem is correct identification of the offending substances. At one time we had difficulty with a medicinal taste imparted to one of our products. We traced this to minute amounts of chlorophenols in the paper. The opinion was that this was due to the printer's matrix coated with phenolic resin. At the same time there was the problem of chlorine in the water at the paper mill. However, some of these causes proved too elusive to trace down. The point is that it takes a concerted effort to solve the problem. Even when you surmount your difficulty and identify the odor or flavor, you may not know the cause underlying it.

The elusive character of some of these flavors and odors merely underscores the importance of making best use of the nose and palate in studying the problem. Actual test methods are too well known to merit description here. Such tests as that of placing the material in a covered dish being held at a constant temperature and with a Petrie dish containing mineral oil or butter resting in the same dish are quite well known. Many organizations have done a great deal to further the cause of odor and flavor detection. For example, Arthur D. Little, Inc., Flavor Laboratory, has pioneered such investigations and has made some notable contributions.

Test methods are many. A bibliography is given at the conclusion of the article. It will be noted that basic to most of the methodology is the organoleptic process — the use of nose and palate. *(Turn page)*

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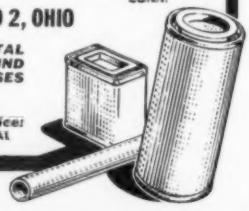


### Flavor Profile Testing

So we have a panel and we have some established test methods. We have a choice of hundreds of test procedures. These range from the triangular tests through the hedonic type of test. However, probably the most objective of them all is the flavor profile method originally proposed by Little's Flavor Laboratory. This represents an attempt to characterize the flavor of the material by its individual notes.

In applying this test, you have several sessions with your panel. The panel members observe or detect things in the order of their appearance while considering a particular specimen. As a result, they develop a catalog of the individual notes of the flavor. From this objective approach, they go on to the measurement of the intensities of the individual notes enumerated in the ratings. These range fom zero through "just detectable" on to "strong" or even "very strong." In short, in the instance of both odor and aroma, the panel members work systematically through the test.

Understanding certain concepts enhances the usefulness of these tests. For example, the concept of amplitude merits the study of those concerned with odor and flavor difficulties of packaging materials. Perhaps amplitude in itself represents a major problem of the flavor profile method. Unfortunately, amplitude is not completely defined even though its attributes become quite apparent to the members of the panel.

An illustration of amplitude is the distinction between an inexpensive perfume and an expensive one. The relative dominance of the notes with regard to each other are the clues to amplitude. The result is that we find with the costlier perfume there is a more general blending of the odor. Turning to food products we note, for example, that the use of monosodium glutamate subdues some of the notes and emphasizes others. To reiterate: All this depends on the use of the nose and palate as analytical instruments.

Applying such methods to the ex-

amination of packaging materials, panel members might find a foreign note in the course of a profile test. The odor given off reduces the amplitude and lowers the general flavor of the material packaged. For example, if rolled oats should show a slight bitter taste when tasted dry, it is probably due to some change in the fat content. As a result when these rolled oats are cooked, they will be lower in flavor amplitude.

You add salt and there is no difference in the odor. But if you add salt to the threshold level (just detectable), you generally increase the amplitude of flavor without changing the aroma.

### Question The Materials

On the other hand, a panel might find direct foreign notes being imparted, and at the same time find the flavor itself down. This could be due to the packaging materials used. Because this represents an unanswered question, it is the kind of subject that deserves more investigation. At the same time, in packaging it is usually essential to consider the odor loss and to emphasize the protection of the packaged product by the packaged material. We have three major phases of the problem: (1) The odor from the packaging material to the product; (2) odor transfer through the packaging material (from some exterior source to the food product); and (3) loss of flavor or odor from the food itself within the package.

It may be necessary to provide "breathing" properties in certain packages. This may prove essential in order to release undesirable locked-in odors. It may be that partially permeable packaging is essential with a particular product. All of this is but a phase of the major problem.

In application we often hear paper and board suppliers suggest the use of odor masking to mask the paper odor. This usually involves adding compounds such as vanillin in an attempt to mask the paper odor. A word of warning: It is important to be sure you are not adding something worse than the odor you seek to mask.

*(Turn page)*


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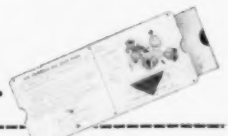

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In the matter of packaging films it may be necessary either to process out the objectionable materials or to mask them. Many complications may arise. We suggest that odor masking is quite an art and has applications extending far beyond the realm of packaging.

In approaching a problem such as the detection of a "papery" flavor in rolled oats, the application of profile techniques will aid in pinpointing the cause or source. For example, the "papery" flavor might or might not come from paper.

The essence of a test interpretation is that we find that some material imparts an odor or flavor. We object to this and we try to describe it to our suppliers. The difficulty is to give a precise description and is like pursuing an elusive quarry. Often the paper or board is perfectly satisfactory itself but has an odor which is objectionable. Test comparisons help us isolate the difficulty. We look forward to a good deal more of investigation along such lines.

## Break Down Mental Blocks

We hope that paper manufacturers and packaging material converters go into these problems more thoroughly. We reiterate that probably the greatest obstacle to the extension of odor and flavor detection in fields such as packaging materials is that both users and suppliers have a mental block. Odor and flavor detection is not as difficult as they might think. Only by breaking this mental barrier and by doing more testing and studying can we develop the fine and minute measurements from which valid interpretations can be made. Basically the approach is to: (1) Establish the problem; (2) select and determine the methodology; (3) apply the methodology, including the profile method to the problem; and (4) then apply all of these directly to the study and evaluation of packaging materials.

We use the profile method and we are investigating gas chromotography. The latter technique may permit us to pinpoint certain materials that are causing difficulty with regard to flavor and odor transfer.

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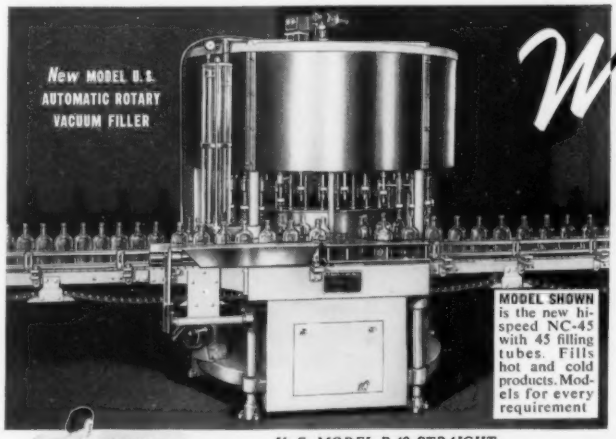
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# Labeling Lines

by George L. N. Meyer, Jr.

## FACTORS INFLUENCING SUCCESSFUL LABELING

*Successful labeling depends upon several factors including the size and shape of the label as well as the size and contour of the surface being labeled.* Good judgement on the part of the user is most important.

### THICKNESS

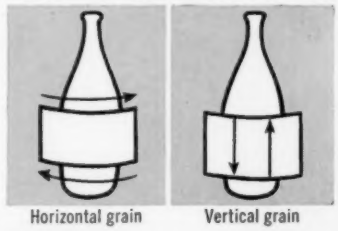
To be basic, labels are generally ordered in pound stock – a phrase referring to the weight of 500 sheets – 25″ x 38″. Most labeling machine manufacturers specify a 50 to 60 pound (coated one side) lithograph stock as being best for the most successful application of paper labels to glass containers. Actually the paper should be .003″ thick for optimum performance.

### MOISTURE

C.1'S or "coated, one side" means a good surface for printing and because the adhesive side is not coated – a good side for adhesive absorption. When an adhesive is applied to the back of the label, moisture is introduced into the paper. Unless the paper absorbs the moisture evenly – wrinkling or blistering will occur. Many times the glue, glass or machine receive the blame for poor labeling, when actually the paper stock is the culprit. *Remember* – if you cannot apply a label by hand without wrinkles or blisters – your problem lies not in the machine but somewhere else. Sounds simple, but many dollars are spent having a machinery Service Engineer come in to point out this fact.

### CURLING

Now, even with ideal paper stock and thickness, good judgement is still all important. A label that is heavily inked, calendered or varnished may be troublesome. These features introduce a tendency for the label to curl too rapidly when moisture is introduced thru the adhesive. Varnish may cause the ends to curl away from the glass – a heavy deposit of ink may prevent the moisture from being absorbed causing an uneven drying of the label and wrinkling – calendering affects both sides of the paper stock so that the uncoated side is almost like a glass surface; again poor absorption and wrinkling.



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### GRAIN

The label grain should usually be horizontal – parallel to the printing or to the base of the glass container or in the direction of label wrap. A very simple means of determining the direction of the grain is to moisten the entire back surface with water and permit it to curl. If the curl is from top to bottom towards the center (parallel to the printing) the label is horizontally grained. If the curl is from the sides (towards the center) the label is vertically grained. The goal is to have the label grain assist the labeling application which it will do when it's horizontal. If the grain is vertical, the label will try to lift off the glass container and cause undue trouble on the production line.

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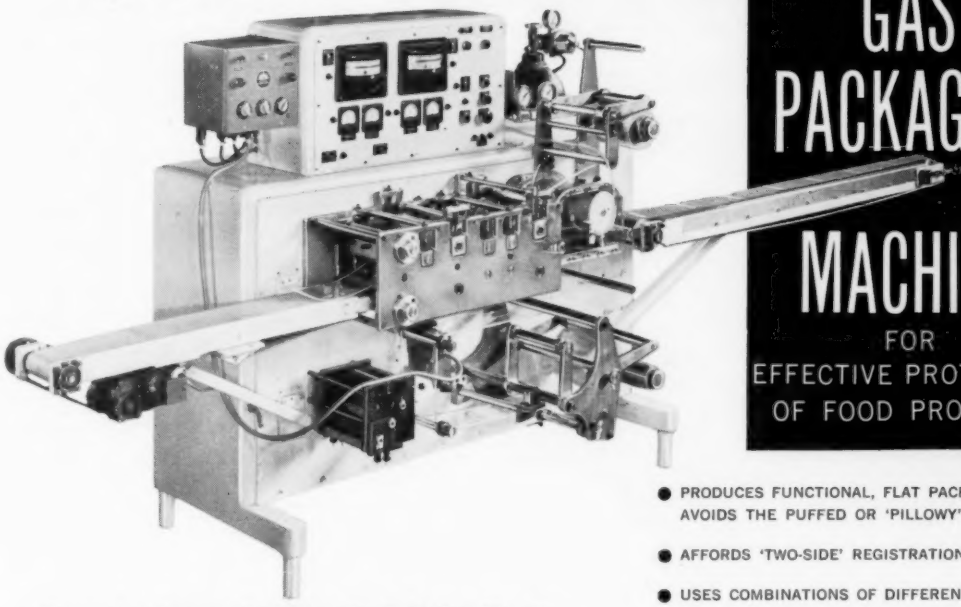

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**Nick Stuffer** is a graduate of Mount Union College with a B.S. degree in physics. He undertook further engineering study at Fenn College, as well as graduate work at Case Institute of Technology. Associated with the Lighting Division of Westinghouse since 1945, Mr. Stuffer is currently engaged in product development engineering. His previous assignments at Westinghouse have ranged from photometric testing and materials and process application, lighting product design, engineering advisory to manufacturing, as well as packaging standardization.

# ENGINEERING APPROACH LEADS TO ECONOMICAL PACKAGING STANDARDIZATION

By NICK STUFFER,
Design Engineer,
Lighting Division, Vicksburg Works,
Westinghouse Electric Corporation,
Vicksburg, Mississippi

***Facing the problem*** *of an ever-increasing number of packaging material types and sizes, the Lighting Division of Westinghouse hit on an engineered approach. This included development and execution of a four-point goal and the refinement of packaging specifications — geared to the needs of those on the line. Mr. Stuffer offers, in effect, a blueprint of standardization and simplification of packaging materials and techniques.*

By developing an engineered packaging program for our lighting products in terms of a four-point predetermined group of advantages, we are now experiencing a 22% reduction of packaging material types and sizes, as well as a 22% savings in packaging material cost. Our four points are (1) physical reduction of inventory, (2) economical standardization, (3) basic simplification, and (4) adequate protection. In addition to the achievement of the four-point program, we have also gained continuing benefits by revising and improving our method of reporting packing specifications.

This program marks the first time that the Lighting Division of our company has assigned a lighting product design engineer to a full time project of studying and developing economical packing standardization requirements for its products. Since packaging materials represent one of the top five major items purchased by our plant, our management decided that this course of action was most expedient and essential. In meeting this assignment we evolved our four-point program which serves as a blueprint of the program itself as well as a predetermination of our goals.

Our plant manufactures a complete line of commercial and industrial fluorescent and incandescent lighting equipment. Since this varied line of lighting equipment represents a sizeable number of different shapes and dimensions, our initial task was to reach a common denominator as a basis for standardizing and simplifying the packing of these items.

### Size Classification Grouping

Many approaches were tested in the attempt to reach a common denominator for such a wide variety of product shapes and sizes. The approach which appeared to be the most promising was to divide our product line into four basic size classification groups. To establish these four basic groups, we listed the over-all dimensions of our products according to a progression as to their length, width, and height. The progression of product width and height presented the possibility of having a minimum number of size classification groupings. We were seeking an approach rather than the final determination of package groupings.

Merely dividing our product line into four basic size classification groups was not enough because we also had to consider each product according to the volume of units produced. Therefore we grouped our products not only by size classification but also by volume produced. In the final analysis, product volume proved to be a very important element which required several changes in the original product lineup under the four basic groupings.

Having arrived at this approach to the basic problem, our next step was to test it. To do this we obtained a set of full size sections of each product of one given size classification to determine whether or not these varying items would go into a common carton size. The full size product sections were shortened to one-foot lengths and were taken to

one of our packaging supplier's plants. With the aid of our supplier's packaging designer, we made a set of experimental package designs for this product group. One end of the carton was left open intentionally so that we could study the inner packing and space requirements for each product. This open carton feature proved to be a valuable demonstrator in showing to our management that this was the proper approach to economical packing standardization.

### Supplier Assistance Invited

Since the experimental packaging designs for the one-foot long full size product sections proved to be economically possible, our management decided that all of our suppliers should be invited to take an active part in this program. It was our feeling that the more ideas and suggestions that could be obtained at this early stage, the more successful would be this program.

All of our suppliers were invited to send their packaging designers to our plant for a one-day meeting and plant inspection trip. This meeting marks the first time that our company has brought together all of our suppliers to attend the same meeting and to be given the same objectives of the proposed packaging program. This group of packaging designers was given the findings of the program thus far completed, and was introduced to the four-point program. Each supplier would receive an identical set of products which represented one of the four basic size classification groups, and all were requested to provide actual packing designs by a specific completion date.

Immediate arrangements were made for the author to visit each of the supplier's plants to answer general questions concerning product requirements. A second visitation by the author would be made, at a time which would be convenient to the supplier, to review the results of the proposed packaging designs as well as to witness the testing of each product packaging.

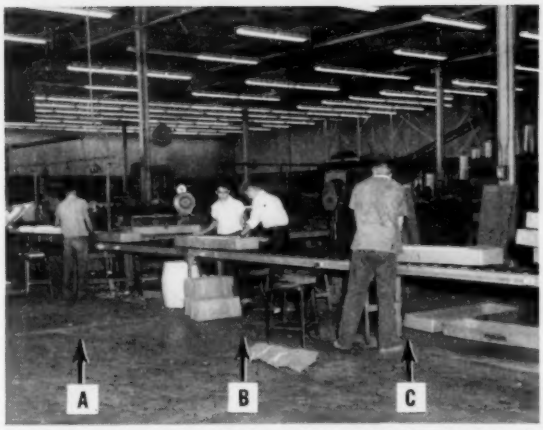


**Fig. 1.** General view of packaging line. (A) Luminaire placed in telescope bottom; (B) Placement of side and top inner packing; (C) Placement of end inner packing. Note: Package now ready for telescope carton top. See Fig. 2.

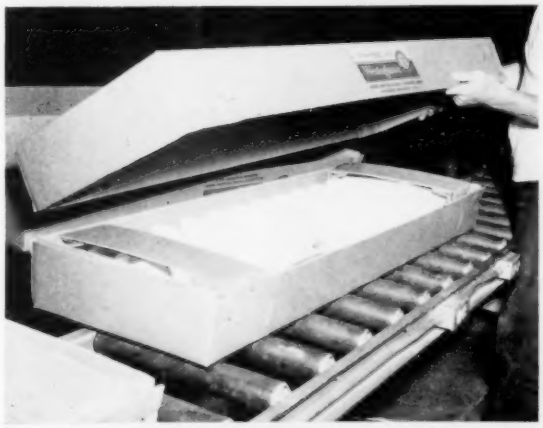

**Fig. 2.** Close-up view of product package. Placement of telescope carton top completes product packaging. Next step is to staple carton top to carton bottom along both carton side panels. See Fig. 3.

### Four Point Review

As the packaging design work progressed, we reviewed and emphasized our four-point program with our suppliers. We wanted them to understand just what we meant by the points enumerated.

**(1) Physical reduction of inventory.** This refers primarily to the reduction of the number of different pieces of packaging materials required for these products.

**(2) Economical standardization.** To determine this factor we would ask the question, "Does the reduction of the number of different pieces justify the actual material cost extended by the product volume produced?" It is important to consider this point from the standpoint of the number of pieces, the product volume, and the actual material cost factors. In many cases, it would be economical to pack a low volume product in a larger carton designed for higher volume products so as to achieve standardization.

**(3) Basic simplification.** This refers to our in-plant operation, including the number of pieces, the possibility of their being difficult to assemble, the ease or difficulty of handling them on the packaging line, and the simplification of contours in order to facilitate the operation on the line. We wanted to avoid over-packing and we sought to avoid items entailing prefabrication—such as built up corrugated pads.

**(4) Adequate protection.** In order to give proper definition to this point, we used the requirements

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of the National Safe Transit Committee. We considered these standards as our criterion for the new packaging designs.

As a further test for adequate protection, we requested our suppliers to return the proposed designs containing the specimen products as unmarked cartons. In other words, we wanted the products shipped without any "caution" labels or other identifying data that might affect the handling of the packages. We directed them to return these to us via railway express. We requested this because it would involve a truck-to-train movement, a train trip, and a train-to-truck movement as well as a final trucking operation into our plant. We felt that these movements represented the possible conditions which our products would encounter. Also, we took steps to insure that the test shipment would include products of various lengths, which would be more representative of our product line.

### Close In-Plant Study

At the completion of the design work by each supplier, all of the package shipments came through without damage. Subsequently we found some damage due to testing at the supplier's plant. However, the damage areas were marked on the product, so that it was clearly dissociated from the actual test shipments.

We evaluated the ideas represented by the design work of each supplier by placing similar products side by side and comparing the new proposed designs with the present production packaging. Further, each supplier's set of packing designs was evaluated as a whole and reviewed to determine if the designs satisfied the four-point program.

At this point, we had the various people in our plant who were concerned with packaging review the new designs. For example, the industrial engineering representatives reviewed all of the designs from the standpoint of time study and related factors. They studied the ease of assembly as well as the methods and work entailed in each design. We wanted their opinions because of

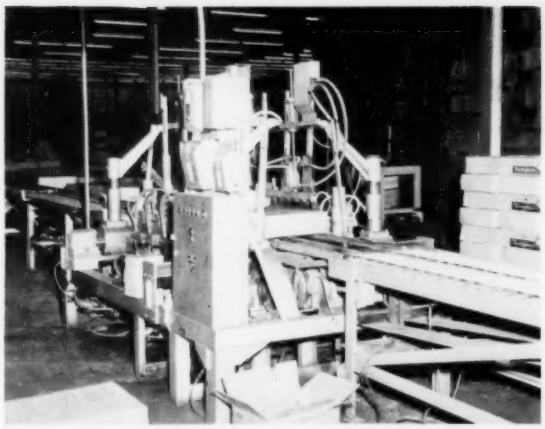

**Fig. 3.** Close-up view of automatic stapler. Automatic stapler presses carton top closed before placing staples, evenly spaced, into both telescope carton side panels. Next step is to deliver product package to shipping warehouse.

**Fig. 4.** The before and after design. Top package is the design before we standardized and bottom package is final result of this program — considerably less packing is required. Testing of package design has proven final result as being satisfactory.

their extensive experience in developing work methods. They studied the economy of motion from the production standpoint. Ultimately the industrial engineering group suggested certain improvements on equipment placement and work methods.

Similarly, our quality control people reviewed the new packaging from the standpoint of adequate protection. The quality control group is concerned primarily with the reaction of the customer—in particular as to whether or not the product is received in good condition. This involved a review of the new designs based on how well the new designs would withstand warehousing at our plant, as well as at our distributor's warehouse, and how well they would withstand multiple shipments between our plant, distributor's warehouse, and the ultimate customer.

Also, our foremen in charge of the packaging lines were invited to give their evaluation of the new designs from an operating point of view. We wanted them to see how the new designs would affect their production techniques and to determine whether or not new difficulties might be anticipated.

Last but not the least important was to decide which group of designs represented the most favorable economics for our packaging requirements. This factor would greatly influence the future status of this packaging program by our management. At the completion of the final analysis of all the in-plant reviews and studies, it was decided that our next


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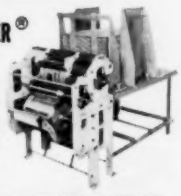

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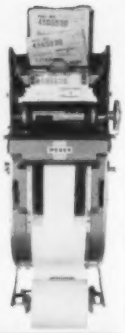

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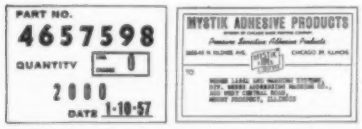


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step would be to work with one of our suppliers in extending the design ideas for the one basic size classification into the remaining three groups.

## Completing Our Program

A set of representative product sizes for each of the four size classification groups was sent to the supplier's plant for final packaging de-

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LIGHTING DIVISION, VICKSBURG WORKS, VICKSBURG, MISSISSIPPI, U.S.A.

INNER PACKING: PAGE A1 V.P.I 5007

| SUB | STYLE NO. | REVISED STYLE NO. | DESCRIPTION | SEE P.S. | TEST | FLUTE | DIE CUTTING PANEL | SIZE IN INCHES DIMENSIONS A | B | C | D | E | F | G | H | J | K | REMARKS L | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | H01 | | S D.C. SH. | 1 | 200 | B | "A" | 11 1/16 | 19 3/4 | 4 | 3 3/16 | 2 1/4 | 12 1/8 | 7 1/16 | 10 3/8 | 2 | 1 3/4 | 1 1/4 | 1 7/8 | REF. STYLE 1604A9 | |
| A | H02 | | S D.C. SH. | 2 | 200 | A | "B" | 15 3/8 | 14 1/2 | 3 7/8 | 4 1/8 | 3 1/2 | 2 3/4 | 6 1/2 | 10 3/8 | 12 1/2 | 5 | 1 1/2 | 1 3/4 | 1 | | |
| A | H03 | S | SC 45L SH. | 4 | 275 | AB | "E" | 14 1/2 | 6 | 4 | REF. | REF. | | | | | | | | | |
| A | H04 | S | D.C. SH | 3 | 200 | B | "B" | 19 1/4 | 5 1/8 | 12 1/4 | 7 3/16 | 10 1/8 | 3 3/4 | 4 5/8 | 15 3/4 | | | REF. STYLE 1760452 | | | |
| A | H05 | S | D.C. SH. | 5 | 275 | AB | "B" | 23 3/16 | 20 1/16 | 5 1/4 | 7 7/16 | 8 | 4 3/4 | 11 1/4 | 3/4 | 2 3/4 | 5 | 3 1/4 | 1 5/8 | 13/4 | 15/8 W |
| B | H06 | S | D.C. SH | 6 | 275 | A | "A" | 52 3/16 | 4 1/2 | 4 7/8 | 3 1/16 | 4 1/16 | 4 3/16 | 17 3/16 | 1/4 | 3/8 | 16 3/8 | 14 3/8 | 7 1/16 | 1 | 4 1/2 |
| A | H07 | S | D.C. SH | 6 | 275 | A | "A" | 43 | 4 1/2 | 3 1/2 | 2 7/8 | 3 5/8 | 4 1/16 | 12 7/8 | 1/4 | 3/16 | 12 3/8 | 10 3/8 | 5 5/8 | 1 3/8 | 4 1/2 |
| B | H08 | S | D.C. SH | 7 | 275 | B | "A" | 15 3/8 | 5 | 1 1/2 | 2 | 1 1/2 | 3 3/16 | 1/2 | 1 3/8 | 1/4 | 1 3/8 | | | | |
| A | H09 | S | D.C. SH | 7 | 275 | B | "A" | 11 7/8 | 5 | 1 1/2 | 2 | 1 1/2 | 3 3/16 | 1/4 | 1 3/8 | 1/4 | 1 3/8 | | | | |
| B | H10 | S | SC SH | 8 | 200 | A | "D" | 17 | 4 1/16 | 4 | REF. | REF. | | | | | | | | | |
| B | H11 | S | SC SH | 8 | 200 | A | "D" | 12 1/16 | 4 1/16 | 4 | REF. | REF. | | | | | | | | | |
| B | H12 | S | SC SH | 9 | 275 | A | "A" | 27 1/8 | 9 1/2 | 1 | 5 5/16 | 11 1/2 | 4 5/8 | 4 5/8 | 1/4 | 4 1/2 | | | | | |
| B | H13 | S | SC SH | 9 | 200 | A | "A" | 22 1/4 | 9 3/8 | 1 | 3 7/8 | 12 1/2 | 4 5/16 | 5 | 1/4 | 4 7/8 | | | | | |
| C | H14 | S | TUBE | 10 | 200 | A | "C" | 7 | 3 1/16 | 4 | REF. | | | | | | | | | | |
| C | H15 | S | SC SH | 11 | 200 | A | "B" | 22 1/16 | 9 1/16 | 2 3/16 | 2 1/16 | 12 1/2 | 4 5/16 | 5 | 1/4 | 4 7/8 | | | | | |
| A | H16 | S | SC SH. | 12 | 200 | A | D | 15 5/8 | 4 1/8 | 4 | REF. | | | | | | | | | | |
| C | H17 | S | SC SH. | 12 | 200 | A | "D" | 12 | 4 1/8 | 4 | REF. | | | | | | | | | | |
| C | H18 | S | SC SH | 14 | 200 | A | "A" | 20 1/8 | 8 3/8 | 1 5/8 | 5 3/8 | 4 5/8 | 4 1/16 | 3/8 | 7/8 | 4 7/16 | 1/4 | | | | |
| D | H19 | S | SC SH | 15 | 275 | A | "A" | 43 3/8 | 4 1/2 | 2 1/2 | 2 | 4 1/2 | 5 1/2 | 15 7/8 | 5 | 3/4 | 9/16 | 1/4 | 15/8 | 14 3/8 | 10 3/8 |
| D | H20 | S | SC SH | 15 | 275 | A | "A" | 41 1/2 | 4 1/2 | 2 7/8 | 2 1/2 | 4 3/8 | 5 5/8 | 12 | 5 | 7/8 | 9/16 | 1/4 | 11 3/8 | 10 1/8 | 6 |
| B | H21 | S | SC SH | 16 | 275 | A | "A" | 67 1/8 | 4 1/2 | 7 1/16 | 11/16 | 7 3/8 | 4 1/4 | 5 3/8 | 15 3/8 | | 1 3/4 | 5 3/4 | 13/4 | 15 1/8 | 14 1/2 |
| D | H22 | S | SC SH. | 16 | 275 | A | "A" | 56 3/8 | 4 1/2 | 6 7/8 | 1/16 | 5 3/8 | 4 1/2 | 5 3/4 | 12 | | 1 | 5 1/16 | 1 3/8 | 11 3/8 | 10 3/8 |
| C | H23 | N | SC SH | 8 | 200 | AB | "D" | 14 | 6 3/8 | 12 3/8 | RES. | RES. | | | | | | | | | |
| D | H24 | S | SC SH | 17 | 200 | A | A | 67 1/4 | 48 3/8 | 6 | 2 3/8 | 1 3/8 | 46 3/8 | | | | | HEAVY SCORING | | | |
| D | H25 | S | SC SH | 17 | 200 | A | A | 43 3/4 | 48 3/8 | 6 | 2 3/8 | 1 3/8 | 22 3/8 | | | | | HEAVY SCORING | | | |

**Fig. 5.** Illustrative of the simplification of packaging detail information, Westinghouse now lists all items of inner packing on one specification as seen here. This makes it easy for its engineers and packaging specialists to review these items. As a result, the specifications serve as reference standards for future packaging design.

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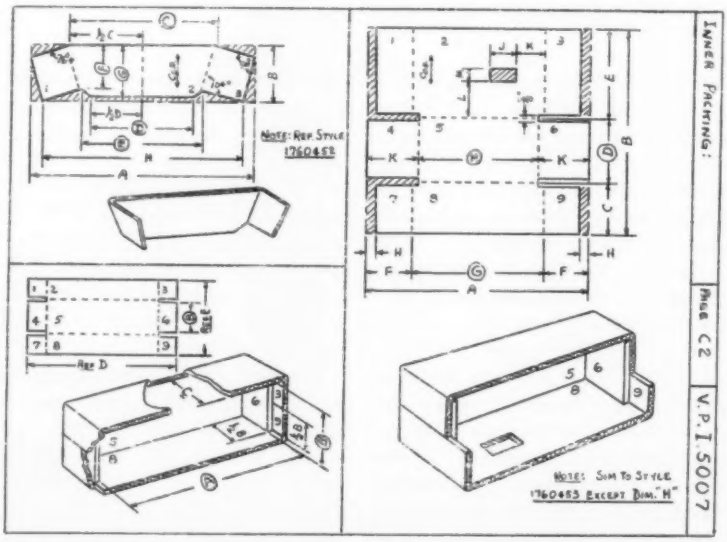


**Fig. 6.** The second phase of a typical application specification includes a third dimension drawing that illustrates the use of the items referred to in such a sheet as that shown in Fig. 5. The notes on both Figures 5 and 6 refer to other specifications of the particular group involved. Both of these work together to take the guesswork out of packaging.

sign completion. The author spent approximately two weeks at the supplier's plant working with its designers, after the designers had time enough to review the total project requirements. The problems and suggestions obtained from our industrial engineers, quality control, and foremen were listed and discussed with the designers for their study and consideration.

Thus far, the work has been more or less an exploratory study. Based on past experiences, our work on economical standardization took on new dimensions. We were no longer working with just one group size, but had to consider how each piece of packaging material could be employed on different products of all size classification groups. At this stage, we had to constantly review each step of the development to determine if the end results would increase or decrease the total number of pieces presently employed on our product packaging. We had to make many rough estimates of material costs to determine if the new designs would increase or decrease the final product cost. A good indication of this cost factor was to compare the total area of the new packaging design with that of the present packaging, and make corresponding adjustments for the difference in test board as well as for single versus double wall material.

As this work progressed, we evaluated each piece of inner packing to determine if the requirements of basic simplification were obtained, as well as to make sure that the problems and suggestions offered by our shop people were fulfilled. As each product packaging design was completed, we would test this package according to the requirements of the National Safe Transit Committee. If the product indicated a damaged area or a need for more packing protection, we immediately solved this problem before going on to the next product.

After the complete set of new packaging designs was finished, we made one last review check to determine if all the requirements of our four-

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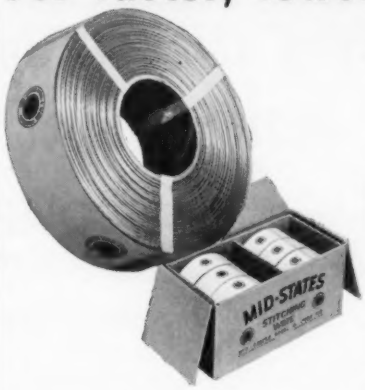


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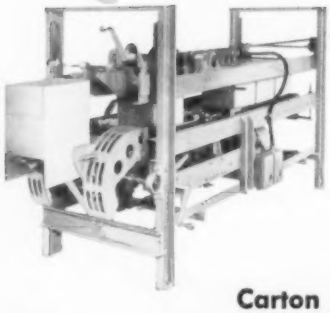

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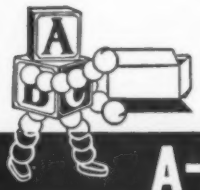

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point program had been accomplished. The fruition of this packaging program would have been less successful if we had given the factor of *product volume* minor consideration. Realizing the importance of product volume in the early stages, we started our final packaging design work with the product having the greatest volume, and then completing the packaging designs for products having a progressively decreasing volume. Following this procedure, we were able to place low volume products in larger than required carton sizes which had been established for the high volume products. There are limitations to this practice and the economics must be thoroughly checked.

Again we had the final packaging designers return the products to our plant using unidentified cartons via railway express. The results of this return shipment indicated that our final packaging was satisfactory from an actual shipment standpoint. After our industrial engineers, quality control people, and foremen had expressed their satisfaction with the final packaging, we went ahead with the final evaluation of the costs involved.

Naturally, the biggest benefit achieved was the savings obtained by the reduction of packing time required, as well as lower material costs. Since it was possible for the final packaging to reduce appreciably the cubic space required by the present production packaging, there was a considerable savings in warehouse space as well as increase in the number of product units which could be placed on a truck or railroad car.

Thus a less significant but importtant savings was obtained by lower freight costs and by releasing valuable floor space for other needed operations. Another benefit on which we are not able to place a direct dollar value was gained by standardizing packaging for several products. This means that we would be able to order 22% fewer number of packaging items and thus the problem of substitution would be improved by having fewer stock items to control.

### Specifications Provide Control

The immense expenditure of time and effort by our suppliers as well as by our company made it necessary to establish control methods that would maintain the packaging standardization thus attained. As a tool of control, we started work on an improved method of reporting packaging specifications. Without control, the number of packaging items would mushroom in a very short time as new products are added to the equipment line.

Therefore, we require a different type of specification which would tabulate the various size packaging materials by specific design styles. For example, we list all of our telescope cartons, approximately four feet long, on one specification. We do the same thing for all eight-foot telescope cartons on another specification. The big advantage of having a tabulation of various size cartons is that when we contemplate adding a new product packaging, we are able to review the list for an existing carton size which will do the job. Our use of these visual control tabular specifications should hold the addition of new carton sizes to a minimum.

In the past, our packaging specifications were written around a specific product line. This specification would include the purchase information as to packaging material sizes, as well as the application method of placing the product into the carton. Therefore each product packaging specification was self-contained and required a lot of repetition which could have been listed under a general specification.

For example, the carton imprinting information had to be repeated for every carton listed on a specification. Our new packaging specification system has developed a general specification which states specifically what is required on all of our cartons. Therefore we state the carton imprinting requirements just once on the general specification. Any deviations or modifications from the general specifications to meet a special product requirement will be noted for the particular packaging item.

The new specification system offers more flexibility by making it easy to specify — for a new product packaging — any desirable carton or inner packing which was designed earlier for a different product. As a further aid to simplification, all dimensions for inner packing are tabulated and suitable drawings (usually two, a flat view and a third dimension view of the item folded) are provided. When we design a new product packing and find that we could use an existing design style except that one or two of the panels are not correct in size, we merely add a new item to the tabulation and make the desired dimensional changes.

Having all of the items of inner packing listed on one specification, we are able to review these items and thus they become reference standards on future packaging designs. Considerable design time is saved by having these standards available as well as by keeping the total number of items to a minimum.

Since we purchase packaging materials from several suppliers, we found that there existed some differences in packaging terminology between the suppliers as well as on the various Westinghouse specifications given to these suppliers. Our new specification solved this problem by providing a list of standard definitions on the general specification which would apply to all of our future packaging items. We have given our definitions for such items as: Direction of corrugation, scoring (standard, reverse, and cut scores), test, and flute. For example, this is what we state for container test: "The minimum test, which will meet the requirements of the United Freight Classification, will be specified. Therefore, a substitution of test must *not* be *down graded*".

### Also Provide Instruction

As we have stated earlier, our original packaging specifications were self-contained for each product line and included both purchasing and application information. When a number of these specifications were placed in book form, they became bulky and difficult to locate the


How

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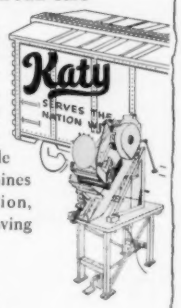
solves typical problems in

IDENTIFICATION and DECORATION

*marking model railroad cars*

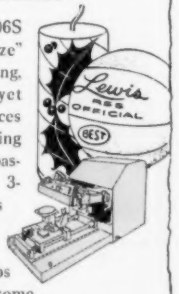



Several leading U. S. toy makers had used decals (costly both to buy and apply) on their replica model train cars. Authentic imprints are now made by Markem 25A machines — speeding production, lowering costs, improving looks.

*imprinting food container lids*

Bothered by the cost, delivery and inventory problems caused by short run lid printing jobs done "outside", a food retailer now prints the lids he needs *as* he needs them, using several 45ABE machines. Supply now matches demand, with the right marking method.

*screen process printing: basketballs . . . to candles*




Markem 90S and 106S machines "mechanize" screen process printing, giving fine detail yet heavy coverage. Surfaces and shapes now being marked range from basketballs, candles and 3-color instrument dials to play shoes, plastic bottles and billfolds. Excellent for many jobs — the *only* method for some.

**These are typical of the thousands of marking problems Markem solves every year for all types of industries. The benefits of 46 years of experience are applied to every job — and can be to yours. Write Markem Machine Company, Keene 35, N. H.**

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The Arenco Machine Company of New York is proud of the outstanding performance of its filling and capping machines—proud, too, of the service it provides to assure prompt delivery, accurate installation and perfect performance.

Typical Arenco personalized service is the experience of Riker Laboratories in Los Angeles. Riker urgently needed an Arenco capping machine to implement production. To meet Riker time requirements Arenco delivered the equipment by air, non-stop from Denmark across the North Pole to Riker Laboratories in Los Angeles!

The unit "was delivered as scheduled", said a Riker Laboratories spokesman, "with a minimum of effort on our part, and we are most grateful to the Arenco Machine Company for their splendid cooperation in this matter."

GAB Automatic Tube Filling and Closing Machine

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specific packaging instructions for a given product.

This bulky problem has been solved by giving our packaging lines only the packaging information which they require to do their job. Therefore, the new packaging books issued to this group contain product packaging application specifications only. An application specification is written for each product line and contains a complete set of packing instructions for each product in that specific product line. The first part of the application specification gives a key sheet layout of each product's packaging as to the quantity required and the identification of the packaging materials to be used, as well as the number of the product to be placed into the package. The second part of the application specification provides a third dimension drawing and written instructions as to the packaging method and product arrangement required.

We have included a new general application specification to cover the general packaging procedures which were of the nature of an unwritten code. We now define such items as carton stapling, carton taping, carton assembly and stitching, as well as a list of possible causes of product damage due to improper packaging methods. This general application specification serves as a reference guide and also as an instruction manual for new personnel placed on the packing lines.

What we have tried to do is take the guesswork out of packaging wherever possible, as well as to keep it simplified. On several product lines, we were able to reduce the number of different style inner packings by developing contoured pieces which would serve both as end fittings and center fittings. Since it was important to have the proper contoured packaging materials closely checked by our receiving inspection, we developed a set of contour templates, with our suppliers, that would indicate in a few seconds whether or not the inner packing items were fabricated correctly without having to measure scoring distances.

Several important points to remember may be summarized as follows:

(1) *Establish a written set of objectives,* which will serve as a blueprint of the proposed program as well as a predetermination of the desired goals. Having written objectives will keep the program moving in the proper direction and thus avoid side track movements because the primary objectives were either forgotten or not kept in view.

(2) *Decide the proper course of action,* which will achieve the desired set of objectives. This course of action should establish the proper approach to the problem, develop the required theories to support the approach, and provide a method of testing the theories to prove that the course of action is economically sound.

(3) *Invite assistance from various sources,* which will provide ideas and suggestions that might not have developed without their assistance. One of the best sources of assistance is from suppliers whose experience on the subject happens to be their livelihood. Assistance from non-professional sources has proven to be valuable. However, all ideas and suggestions should be analyzed to determine whether or not they develop the points established by the set of objectives.

(4) *Review and compare progress made with objectives,* which will measure the over-all effectiveness of the program. If a review is made as each important step is completed, the intent and interest in the program is continued and the possibility of having the program become an enormous, difficult, and perplexing task is avoided.

(5) *Evaluate the final results,* which will indicate whether or not all of the objectives have been achieved. Product volume is a very important factor which must be considered in every step of the program. Economical standardization is dependent upon how well we apply this factor of product volume to the final results.

(6) *Employ control methods,* which will maintain a balance of standardization as new items are added in the future.

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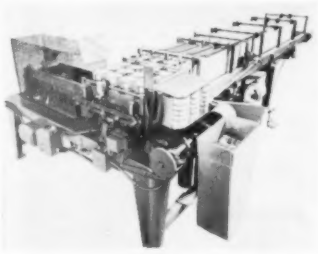
### End-Opening Caser

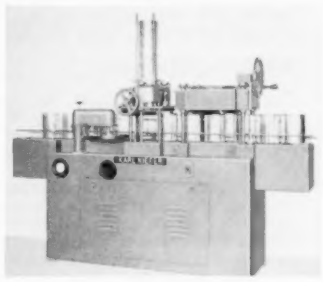
Food Machinery and Chemical Corp., Canning Machinery Div., introduces its new end-opening caser, designed for single tier loading of cans (principally 46 oz. and #10's). Smaller size cans are also accommodated by this machine. Cans travel in an upright position on a wire mesh belt conveyor and are carried through divider lanes into the machine's loading chamber. When a loading tier



has been fully assembled and a shipping case has been positioned on the loading funnel, a pusher plate automatically slides the tier into the case. There is no rolling of cans. The speed of this machine reaches 1,200 cases/hr. or more. Automatic safety features eliminate the possibility of incomplete loading patterns. Circle No. 1.

### Lid Dispenser and Sealer

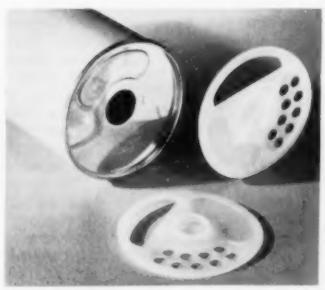
The Karl Kiefer Machine Co. has a machine that provides a high-speed method of dispensing lids and sealing paint cans. Lids are dropped from a magazine onto the cans by a "sure positioning" device, then sealed by an arrangement of compression rollers. A "no can-no lid" device is incorporated. This machine can handle all sizes of cans ranging from 4 oz. to 1 gal. A variable speed control of 6-to-1 ratio is provided to speed up or slow down the operation, giving



delivery of sealed cans at the rate, for example, of from 18 to 100/min. Circle No. 2.

### Snap Locking Plastic Closures

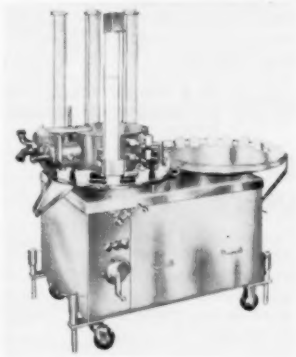
The Cleveland Container Co. announces the development of a polyethylene closure that snaps onto fibre



cans. The closure turns readily, but will not slide out of sift, pour, or close positions. Tamper-proof undertop may be furnished if desired. The closures are available in white or a variety of colors. Circle No. 3.

### Cup Filler and Capper

Anderson Brothers Manufacturing Co. has developed Model 331, a high-speed cup filler and capper. A new screw-type stripping action dispenses three cups onto the rotary filling table simultaneously. One dispenser drive unit and three sets of retaining racks are required to accommodate the full range of 3 oz. to 16 oz. standard cups. With four filling orifices, the filling nozzle rotates with the cups as they circle continuously through the capping station and onto



the accumulator table. A triple-action capping station dispenses the lid onto the cup; then the first of two piston-like "cap-tampers" positions the lid lightly and permits trapped air to escape while the second "cap-tamper" firmly seats the lid. Speeds can be varied from a high of 250 cups/min. to 32 cups/min. Circle No. 4.

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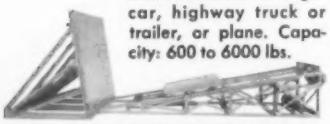
Gaynes INCLINE-IMPACT (Conbur) TESTER duplicates actual impact punishment received in freight car, highway truck or trailer, or plane. Capacity: 600 to 6000 lbs.



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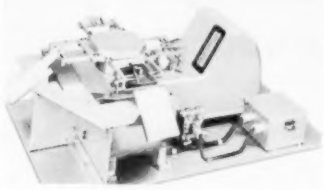
**Checkweighing Machines**

Exact Weight Scale Co. has a new line of Selectrol automatic checkweighing machines, available in capacities of from 1 g. up to 100 lbs. Automatic transfer mechanisms place the commodity on, and remove it from, the weighing element with a minimum of impact, Exact Weight says. The scale weighing element is comprised of an even lever balance Shadograph scale, which provides a visual weight reading dial wtih a friction-less optical light indicating system. The control system consists of direct reading crystal photocells on adjustable mountings alongside the optical reading scale dial. Optional accessories for the Selectrol scales include recorders, counters, and visual



and audible signaling devices. Model #144 (pictured) features a rotary transfer mechanism with one loading station, one weighing station, and two discharge stations. Circle No. 5.

**Monitoring Instrument**

Curtiss-Wright Corp. has developed the Curtiss-Wright Correct Fill Monitor (CFM-1), which is designed to examine either liquids or free flowing solids in any type of container. The unit utilizes controlled radiation to control the level of materials in packages. To achieve high-speed accuracy, the CFM-1 uses a tiny source of beta radiation to inspect each container as it passes on the line. Accuracy to + or − 1% is achieved. Opposite the radiation source is a special type detection tube which is set to receive the radiation pattern established by correctly filled containers. When the pattern is upset by an incorrectly filled container, the CFM-1 actuates a rejection mechanism which ejects the miss-fill from the line. Circle No. 6.

**Bag-Maker and Sheeter**

LectrOmatic Devices, Inc., has developed Deluxe Model 24-100, a unit which can be used as a bag-maker or sheeter without changes. Used as a bag-maker, the machine automatially measures, cuts, and seals one end. It is equipped with two stock shafts and the unit permits running two up. Narrow widths can be run three or more up by adding extra roll racks. Skirt size on bags is adjustable from ½" to zero. The unit will cut and seal polyethylene up to 20 mm. in thickness. As a sheeter, the machine automatically measures, cuts, and dispenses sheets from rolls of Saran, cellophane, Mylar, foil, paper, and the like. Up to 5,520 bags or sheets/hr., depending on length, can be produced, LectrOmatic says. Circle No. 7.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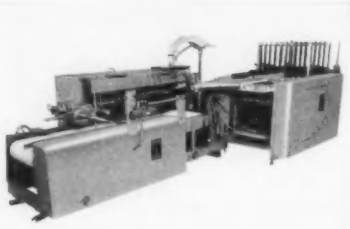

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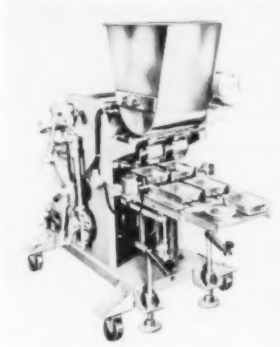
### Frozen Food Packaging

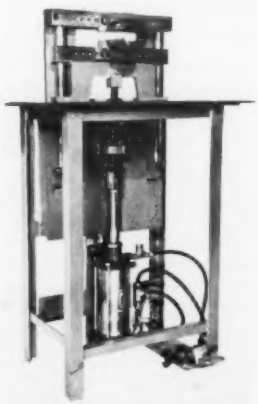
Hope Machine Co. has a filling machine designed for packaging operations in the frozen food industry. The machine permits the automatic conveying of all types and sizes of aluminum trays. The trays are carried to



the filling position where the Hope piston, filling valve, and cylinder measure the quantity of product (semi-solid or liquid) and deposit it into the tray. The machine features a "no container-no fill" device. Aluminum trays 8" x 5" x 3" and aluminum pans 5¾" in diameter by 1½" deep can be accommodated. Other sizes ranging from 9" x 6½" x 4½" to 3¾" x 3" x 1½" may be handled by machines other than the one pictured. Circle No. 8.

### Multi-Unit Packaging Machine

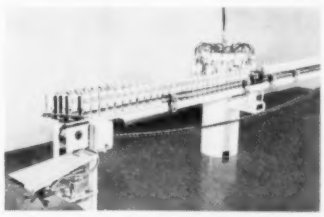
Tee-Pak, Inc., has developed a multi-unit packaging machine utilizing cellulose bands. The machine fits the seamless band over the products, combining them into a single package. Production rate is 20 units/min. for most applications. The tension of the



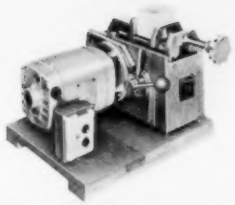
band can be controlled and this feature of the machine makes possible the banding of heavy products where great strength is required, as well as the banding of extremely fragile items. Circle No. 9.

### Aerosol Can Gassing/Mixing

Alpha Engineering & Machine Works, Inc., announces a new rotary feed machine that combines aerosol can gassing and mixing in one operation. The machine, the Alpha A-206 Roto-Shake, moves cans along a pallet-type conveyor to a central rotary feed head. Here the cans are automatically gassed and shaken as they travel



through the rotary feed cycle. They are again moved to the conveyor for automatic removal from the machine. The Alpha A-206 Roto-Shake is adjustable to handle up to 60 cans/min. with a 12 sec. shake cycle. Longer shake cycles are obtained by slowing the rate of feed. This machine can handle 12 oz. and 16 oz. cans. It is equipped with 15 stainless steel gassing valves, each of which has a "no can-no charge" control. Circle No. 10.

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### Package Making, Filling, Sealing

Lynch Corp. has a four-page booklet that describes its Robo-Wrap packaging machines. These units will form, fill, and seal pillow type packages, using any type of heat-sealable flexible material. The equipment will handle solids, powders, liquids, or granules at speeds up to 240 pkgs./min. Circle No. **101.**

### Cellophane Handling

E. I. Dupont de Nemours & Co., Inc.'s Film Dept. offers Booklet A-7525. This booklet provides a check-list of twelve ways to make cellophane work better. Suggestions concerning selection of film, inventory, storage, humidity, heat sealing, and adhesives are included. Circle No. **102.**

### Short Case Sealer

A-B-C Packaging Machine Corp. has a four-page bulletin describing its automatic short case sealer. Available in eight models, this machine is said to dry any commercial sealing glue quickly. Specifications and floor plans are included for these models, designed to handle cases from 6" to 16" wide, 4" to 18" high, and 8" to 18" long. Circle No. **103.**

### Carton Printer

Algene Marking Equipment Co. has a data sheet that pictures and describes a fully automatic knock-down carton printer. Feeding flat cartons from a hopper, this unit will print up to 3000/hr. and is designed as an in-plant printing machine. Type sizes range from 1/8" through 5", and the unit features liquid ink that dries instantly. Circle No. **104.**

### Tape Dispensers

Better Packages, Inc., has issued Resale Catalog 107 which illustrates and gives specifications for 28 different models of tape dispensers that handle gummed sealing tapes or pressure sensitive tapes. Circle No. **105.**

### Plastic Tube Filler And Sealer

A & M Tool & Die Co., Inc., has a bulletin describing two models of a tube filler-sealer that handles plastic tubes and closures. It can also be adapted to fill metal tubes, bottles, and jars. Capacities are adjustable from 2 cc. to 7 oz., with speeds ranging from 20 to 80 tubes/min. A specification check list is included to help you outline your requirements. Circle No. **106.**

### Meat Wrapping Machines

Wrap-King Corp., Div. of Crompton & Knowles Corp., has an information sheet describing two new meat wrapping machines. One unit automatically wraps luncheon meats and frankfurters at speeds of from 30 to 80 pkgs./min. It produces round, square, loaf, or twin packs, using cellophane, Pliofilm, Saran, glassines, foil, waxed papers, etc. The bulletin also describes a wrapper expressly designed for packaging frankfurters in cellophane and other films within a speed range of from 27 to 75 pkgs./min. Circle No. **107.**

### Heat Sealing Equipment

Amsco Packaging Machinery, Inc., manufactures eleven different models of foot-operated bag sealing machines which are described in an illustrated brochure. Seven different sealing surfaces are available in dimensions ranging from 7" long x 1" wide to 22" long x 9/32" wide. These machines are designed for packagers with limited production or as auxiliary machinery in large plants. Circle No. **108.**

### Checkweighing Machine

Bartelt Engineering Co. has a brochure which lists the advantages of the Model CWA checkweigher. This unit automatically handles rectangular packages up to 4½" x 7¾" base size and cans or jars up to 5⅛" in diameter. Normal weight range is between ¼ oz. to 10 lbs. It checkweighs containers at speeds up to 130/min., automatically rejecting off-weight containers to pre-selected weight differentials as accurate as + or — 1/60 oz. Circle No. **109.**

### Adhesives

The Arabol Mfg. Co. offers a handy check list comprised of 23 basic questions to be considered when preparing specifications for packaging adhesives. Answers to these questions can help you determine what qualities and characteristics you most need for a specific adhesive job. Circle No. **110.**

### Versatile Packager

The Bell Machine Co. has a brochure that outlines the "Bell-Pak" machine. This machine will form, fill, and heat-seal flexible materials at speeds up to 400 pkgs./min. Adaptable to solids, liquids, or powders, the machine simultaneously handles different items and different sizes. Package lengths are between 1¾" and 14", and widths range from 1¾" to 9". Circle No. **111.**

### Label Imprinter, Cut-Stacker

Oliver Machinery Co. describes the 806 Label Imprinter, Cut-Stacker in a current illustrated brochure. This machine imprints roll-fed labels with whatever legends are desired, and counts, cuts, and stacks them at rates up to 140 labels/min. The machine is especially useful in preparing labels for pre-packaged foods or other items which are packed in boxes. Circle No. **112.**

### Hardware Packeting

Brown Filling Machine Co. describes the Hardware Formapak in an eight-page illustrated bulletin. This machine is specially designed for packeting such hardware items as nails, screws, nuts, bolts, washers, and similar items at speeds ranging up to 100 packets/min. This machine handles a complete range of heat-sealable papers and various laminates, which can be either preprinted or coded by the machine. Circle No. **113.**

### Roll Through Labeler

Burt Machine Co. offers Bulletin "AUS", which outlines details about its high-speed, non-stop labeler for cans and glass containers. Handling cylindrical packages of 2⅛" to 4¼" diameter by 2" to 7½" high, the machine features a continuous label feed. Circle No. **114.**

### VPI Paper Calculator

Ludlow Papers, Inc., has published a handy booklet that presents the first available chart for simplified calculation of VPI paper requirements necessary to protect a given area. VPI papers are coated with a volatile chemical which protects ferrous metal products against rust. The booklet also includes four fundamental rules for properly handling this material. Circle No. **115.**

### Semi-Liquids Filler

Triangle Package Machinery Co. offers Bulletin No. 253 in which two models of its piston fillers are described. The machines are designed to handle semi-liquid products such as cottage cheese, ice cream, potato salad, etc. The machines operate within a speed range of from 35 to 80 cartons/min. They fill, cap, and code each carton automatically. The machines feature "bottom-up" filling. Circle No. **116.**

### Cellophane Sheeting and Stacking

Peters Machinery Co. lists specifications

for its Model UD cellophane sheeting and stacking machine in a current illustrated data sheet. This machine automatically cuts rolls of various types of cellophane and similar materials into a wide range of desired size sheets within the limits of 4" x 4" to 28" x 28". Circle No. **117.**

### Case Packers

Chisholm-Ryder Co. of Pennsylvania has published Bulletin No. 1657 which explains the advantages of its casers. Four models are described. These machines handle the full range of can sizes from 202 to 610 diameter and up to 910 high. These units feature either right or left-hand discharge and where higher capacities are required, duplicate discharge parts may be added, permitting both right and left-hand discharge and calling for two operators. Circle No. **118.**

### Carton Filling And Sealing

Clybourn Machine Corp. describes its Model C continuous automatic carton filling and sealing machine in Bulletin No. 21. The machine packages granulars, powders, bagged products, and long cut products, such as spaghetti and macaroni. Speeds range up to 60 cartons/min. Five models handle carton sizes ranging from 3" high, 2" wide, ¾" thick to 14" high, 10" wide, 5" thick. Circle No. **119.**

### Automatic Cartoner

Container Equipment Corp. describes its Model 40 cartoning machine in a current bulletin. It automatically moves cartons from flats in the hopper to the closing or sealing stations, allowing for hand insertion of the product. Producing sealed cartons up to 90/min., machine handles glue seal cartons, straight tuck cartons, reverse tuck cartons, or any combination of these. Carton sizes handled range from 1" long, ½" wide, 1⅝" deep, to 10" long, 5" wide, 30" deep. Circle No. **120.**

### Counting Machine

Delta Engineering Corp. has a one-page leaflet describing its Model B universal counting machine, which has a feeding rate of 120 ft./min. Hardware and other typical items which the machine counts are illustrated along with the machine itself. Circle No. **121.**

### Impact Recorders

The Impact-O-Graph Corp. has a four-page bulletin that describes various models of its impact, acceleration, and gravity recorders. These instruments are small in size and light in weight. They record data permanently on a special wax-coated recording tape. The machines are designed to record shocks, impacts, and vibrations from any direction. A list of specifications and other features of the various models is included. Circle No. **122.**

### Package Labeling Innovation

Dennison Manufacturing Co. has a brochure announcing a new labeling process called "Thermagraphy." This method involves the transfer of a preprinted label design from a roll of special label paper directly onto the unprinted packaging material. The result is said to compare with printed film and offers better adhesion, less bulk, and faster application than conventional labeling. It is suitable for reverse plate printing, halftones, and process color work. Transfer unit can be attached to wrapping, bundling, or bag making machines. Circle No. **123.**

### Tape Dispensers

Derby Sealers, Inc., have assembled a group of data sheets into a catalog binder. These bulletins describe and give specifications for a wide variety of gummed and pressure sensitive tape dispensers, barrier wrap dispensers, and polyethylene bag neck band sealers. Circle No. **124.**

### Cut-Off Control

Electronic Machine Parts, Inc., has a bulletin which outlines features of a line of photoelectric instruments that control webs of packaging material, insuring accurate cut-off. All models and components are plug-in. They are particularly adapted to high-speed wrapping machines and bag makers. Circle No. **125.**

### Twin Filler

Elgin Mfg. Co. has a data sheet giving information concerning its twin filler. This data sheet contains such specifications as the amount of floor space used, table height, maximum over-all height, capacity of reservior, shipping weight, etc., of this machine. Circle No. **126.**

### Non-Slip Coating

Paisley Products, Inc., Div. of Morningstar, Nicol, Inc., has published the Horowitz report, which offers data on Paisley Non-Slip Coating No. 1715. This coating is sprayed on corrugated shipping containers or blanks to prevent stacked goods from skidding and toppling during movement, vibration, and handling. Other data on coating No. 1715 lists recommended methods for its application and case histories from users of this material. Circle No. **127.**

### Auger Packer-Weigher

J. L. Ferguson Co. offers a data sheet describing its turret-type packer-weigher. Designed for packaging soft powdered products, this machine can be adjusted to containers from 6" to 22" high, with weights ranging from 1 lb. to 25 lbs. Circle No. **128.**

### Accumulator And Bundler

Hayssen Mfg. Co. has an illustrated bulletin telling how savings can be effected by bundling unit packages together in film or paper wraps, eliminating the need for intermediate cartons or bags. Labeling and imprinting units are available for use with this equipment. Circle No. **129.**

### Liquid Fillers

Horix Mfg. Co. has an illustrated Bulletin No. 155, a digest of 13 models of its fillers for still liquids or semi-liquids. Accuracy of fill is guaranteed to + or — 1/64" at any speed, handling container sizes of 1 oz. to 5 gal. Circle No. **130.**

### Case Stapler

International Staple & Machine Co. has a four-page brochure explaining details of the "Dual Stapler." This machine simultaneously staples the tops and bottoms of many types of shipping cases, after they have been filled. Case sizes handled range from 5" to 24" wide and 5" to 36" high. Circle No. **131.**

### Container Handling Equipment

Island Equipment Corp. offers Bulletin ST-1, which lists specifications for a variety of straight line and rotary unscrambling tables, accumulating tables, lateral curve conveyors, and special purpose conveyors. This booklet is well illustrated with photographs and mechanical drawings, and includes a chain conveyor engineering data table as well as a tabulation of coefficients of friction. This equipment is designed to handle bottles, jars, and cans. Circle No. **132.**

### Vertical Cartoner

R. A. Jones & Co., Inc., offers Bulletin CMV-56, which illustrates operating sequence of its vertical cartoner. The machine opens cartons, tucks bottoms, moves them through loading station, and tucks tops. One operator can load as many as 75 pieces/min. Two models handle carton sizes ranging from 2½" x ¾" x ½" to 9" x 4¼" x 4¼". Circle No. **133.**

### Tablet Counter

The Lakso Co., Inc., has an information sheet describing the new "48" Tablet


King GLUERS are used by ORTHO everywhere

ORTHO
CALIFORNIA SPRAY-CHEMICAL CORPORATION
Lucas Street & Ortho Way · Richmond, California
August 2, 1957

King Sales and Engineering Company
441 Folsom Street
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Gentlemen:

We have over 70 King Gluers in use in our manufacturing plants throughout the United States, Canada, Mexico and Puerto Rico. We started using them about 1946 and have adopted them as standard equipment.

We tried out other machines, which were excellent, but had some weaknesses which caused them to be unsatisfactory in overall performance by comparison. We have stuck to the King because they contribute to an economy in standardization, and they are efficient and reliable.

We use your Gluers for a variety of operations. The principal use is for gumming bag labels. They are also used for labeling certain carton cases, and for drums.

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TRUE PORTABILITY
POSITIVE CONTROL
EASIEST CLEANING

ECONOMICAL
VERSATILE
EFFICIENT

Best for all manual labeling — shipping — mailing

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Write for details.

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*Easy as dialing a telephone!*

Flip the dial like a telephone to measure tape exactly, moisten perfectly with warm water. Savings up to 25% on gummed tape sealing costs and *safer, stronger, neater* packages.

Used by GM, Ford, General Electric, Caterpillar Tractor, Bendix-Westinghouse, International Shoe and thousands of others . . . who saw a demonstration before they bought.

Mail the coupon below for complete information; and please also check "Free demonstration." Absolutely no obligation. Then get the shipping department set for amazing results.

*DIAL YOUR TAPE FREE for a day—*

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## MARSH *Electric* Dial-Taper

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**MARSH STENCIL MACHINE CO.**
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Yes, Mr. Marsh, send us the Dial-Taper Story with complete information and prices.

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Next time one of your men is near us with a sample DIAL-TAPER have him stop in and show it to us without any obligation.

DT13A

SPECIFICATIONS . . . Approved and listed by Underwriters' Laboratories. Heavy duty totally enclosed motor operates only while feeding tape. 110 volt, 60 cycle A.C.

Tape 1″ to 3″ wide, up to 9″ diam. roll. Dial 3″ to 39″; longer lengths by two rapid dialings. Heavy duty knife cuts paper, cloth or filament inserted tape. Tape speed—THREE FEET per second.

Built-in water heater with thermostat. Two operators can use same machine. Size 21″ long, 9″ wide, 10″ high. Weight 50 lbs. Rugged construction. Guaranteed.

Counter. This machine counts and fills from 45 to 100 bottles of 100's/min. It is completely adjustable for tablet thickness. The unit is furnished on a portable table and uses a floor space measuring 27" x 42". Circle No. 134.

### Vacuum Filler

Machinery Service Co. has a brochure that lists various features of the M-S rotary vacuum filler. Available in 12, 18, or 24 filling tube models, the unit is designed for high-speed filling of any free flowing liquids, light or heavy, foamy or syrupy. Circle No. **135.**

### Semi-Automatic Labeler

MRM Co., Inc., has an illustrated bulletin sheet that describes and gives specifications for the "uprite" semi-automatic labeling machine. Applying labels to containers in an upright position, this unit is hand-fed. It automatically labels and discharges the container. The machine is said to handle a wide variety of package and label shapes. Range of label size varies from ¾" x 1" to 6" x 8". Range of container sizes varies from fractional ounces to gallons. Circle No. **136.**

### Can Marking Machine

Markem Machine Co. has information data sheet No. 70AF which gives specifications for a marking machine designed for imprinting variables such as color, name, or number, batch control, etc., on lithographed or preprinted cans. This unit is quickly adjusted for marking cans in sizes ranging from 1/32 of a gal. to 1 gal., within a speed range of 400 to 1500/hr. Maximum imprint area is 2" high x 6" long. The machine is mounted on rubber casters. Circle No. **137.**

### Case Marking And Taping

Marsh Stencil Machine Co. offers Products Folder-57, illustrating and describing its marking and stenciling equipment. Stenciling machines are available in hand-operated or electrically-operated models that cut letters ¼", ½", ¾", and 1" in height. Fountain stencil brushes are reviewed as well as a wide variety of inks. Two electric tape dispensers are described. Circle No. **138.**

### Film Tube Packager

Mercury Heat Sealing Equipment Co. explains the operation of the "Verti-Pak" machine in a bulletin. It automatically forms a bag from heat-sealable roll stock, fills, and seals it. This unit handles hardware, toys, textiles, candy, drugs, produce, etc., at speeds of 30 to 50 pkgs./min. Circle No. **139.**

### Versatile Wrapper

National Equipment Corp. describes its "Speed-Wrap," a portable wrapping machine, in a current information sheet. Offering a choice of folds, it handles cellophane, Pliofilm, foil, and heat-sealable papers. Speeds range between 800 to 1200/hr., handling tray-type packages in sizes up to 15" long, 9½" wide, and 5" high. Circle No. **140.**

### Bundling In Cellophane

Olin Mathieson Chemical Corp., Film Div., offers an interesting bulletin which outlines the many cost savings made possible by bundling multiple packages in cellophane. Suggested basic bundling arrangements are for different shaped packages such as tall, flat, round, and irregularly-shaped objects. An estimate work sheet that can be used to compare present costs with the cost of bundling is provided. After the necessary basic information is filled in, Olin Mathieson will prepare the cost estimate comparison for you. Circle No. **141.**

### Powder Fillers

Pneumatic Scale Corp., Ltd., has issued Bulletin 136 which gives information about its line of Vacuflow powder fillers. These machines have operating speeds ranging up to 300 containers/min. All operate on the basic principle of controlled vacuum filling instead of pressure to pack powders. Photographs and drawings illustrate the explanatory material. Circle No. **142.**

### Cushioning Material

Armour & Co., Curled Hair Div., has a booklet, "How to Pack for Maximum Instrument Protection," which illustrates application of Hairflex, a rubberized curled hair cushioning material. This material is available in sheets and rolls. It can be die-cut and laminated or molded to the shape of your product. Hairflex is highly resilient, moisture and fungus resistant, and non-abrading. Load compression curves are shown which enable you to determine the thickness of the padding needed to protect your product properly. Circle No. **143.**

### Conveyor Chains

Chain Belt Co. Bulletin 56-60 is a 26-page catalog profusely illustrated with photographs and mechanical drawings of the Rex conveyor chains. These include steel and nylon tabletop chains, steel platetop chains, crescent top chains, and case conveyor chains. These conveyors handle bottles, cans, jars, and boxes. Conveyor layouts are included as well as engineering and application data in tabular form. Circle No. **144.**

### Packaging Machinery Catalog

Wright Machinery Co. describes its diverse line of equipment in a 24-page catalog. Well illustrated, it gives standard specifications for weighers and fillers of dry- free-flowing products for cartons and bags, as well as cracker sandwich wrappers, and a liquor bottle strip stamp machine. Circle No. **145.**

### Parts And Hardware Packaging

Packmaster Sales Co. has a brochure describing three models of the Packmaster. An automatic machine, it loads and heat seals packets with oddly-shaped products, such as parts, hardware, etc., in a variety of military and industrial flexible packaging materials. Speeds range up to 80/min. Circle No. **146.**

### Coatings For Packaging

Pyroxylin Products has a comprehensive catalog giving specifications and properties of coatings for paper, paperboard, foil, and film used in packaging and converting. Eighty-eight different uses are listed in the index. Circle No. **147.**

### Cartoning And Overwrapping

F. B. Redington Co. has a comprehensive 40-page catalog illustrating and describing 18 different types of standard cartoning equipment, as well as many special machines for tablet counting and filling, banding, envelope filling, etc. Semi-automatic and fully automatic cartoners are listed with optional cellophane overwrapping machines. Complete packaging systems are available which set up cartons, load, and overwrap them. A wide range of products is packaged on these machines, including specialty foods, drugs, soaps, paper napkins, crackers, roll bandages, and film. Circle No. **148.**

### Cappers And Sealers

Resina Automatic Machinery Co., Inc., has a gate-fold brochure showing ten different models of its line of bottle and jar cappers and edible oil can sealers. Semi-automatic and fully automatic models are described. Speeds range from 20 to 200/min. Circle No. **149.**

### Semi-Automatic Wrappers

Schooler Mfg. Co. offers a bulletin showing five models of its line of semi-automatic wrappers. Using cellophane, wax paper, or foil, these machines produce up to 1200 pkgs./hr. They handle sizes ranging from 1¼" to 12" long, 1" to 8" wide, ¾" to 4" high, making adjustments without change parts. Circle No. **150.**

### Wrap-Around Labelers

Standard-Knapp Div. of Emhart Mfg. Co. offers Bulletin HDL-5 that provides pictures and specifications of nine different models of wrap-around labelers. These machines handle cans, bottles, jars, and pails, within a speed range of 150 to 1000/min. Circle No. **151.**

### Packaging Adhesives

Swift & Co. has prepared a handy booklet outlining the wide variety of adhesives it offers the packaging field. Brief descriptions of different packaging applications are provided which include top and bottom case sealing, tight wrapping, multiple unit packaging, folding cartons, set-up boxes, glass and can labeling, tube winding, laminating, bag manufacture, and bag closure. Circle No. **152.**

### Industrial Parts Packaging

Pak-Rapid, Inc., offers a data sheet on a pouch making, loading, and sealing machine for small parts. It automatically packages even or odd shaped items in single or multiple units, whether oily or dry, up to 1¼" thick, in transparent films, barrier papers, or foil laminations. This unit meets all requirements of MIL-P-116-B Method 1 packs, and MIL-STD-129 identification requirements, even to evacuating all trapped air required under Method 1A8. Circle No. **153.**

### Roll Labels

Allen Hollander Co. offers testing samples of No-Curl Rollaway labels, a product just introduced. These perforated roll address labels are made of a paper and adhesives combination which resists curling and runs smoothly. A complete roll can be run without stopping for adjustments, Hollander says. Circle No. **154.**

### Vibratory Parts Feeders

Syntron Co. has a twelve-page catalog that explains the operating details of its vertical-vibratory parts feeders, which provide automatic, oriented positioning and single line feeding of various sized and shaped parts. They feed small parts made of metal, wood, glass, plastic, etc. to packaging machines. The variety of shapes is practically limitless within a size range of between ¾" and 4" in length. Both electric and air-operated models are available for handling such products as pencil leads, nails, rubber stoppers, grommets, screws, washers, and bottle caps. Circle No. **155.**

### Thermal Impulse Heat Sealing

Vertrod Corp. has an eight-page brochure that gives specifications for six models of thermal impulse sealers. These units weld thermoplastic films by introducing a short but powerful heat impulse and then cool film under pressure. Machines listed range from portable hand models with 4" sealing length up to a large floor model with a 42" sealing length. Circle No. **156.**

### Paper Web-Wetters

Walton Laboratories, Inc., lists specifications and prices for seven models of its moisture conditioners for moving fibrous webs. Mechanical drawings are included. Circle No. **157.**

### Net Weighers

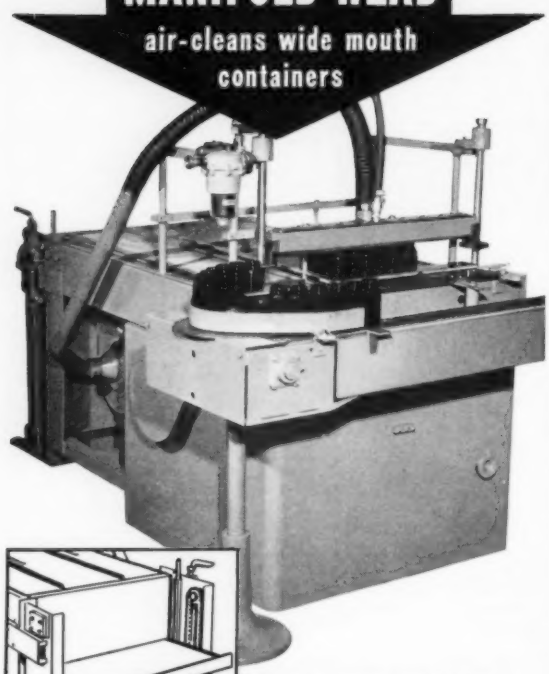
The Woodman Co. has a data sheet on its "Plur-A-Matic" line of high-speed net weighing machines. Adapted to high density products, these units are available with from one to four scales, and feature a complete, self-contained electrical system. Circle No. **158.**

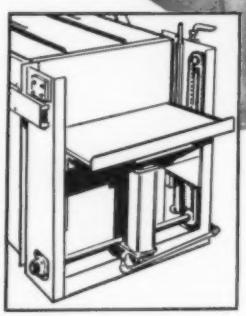
### Heat Sealing Crimpers

Wrap-Ade Machine Co., Inc., offers three models of heat sealing crimpers in a current four-page brochure. These units are available in automatic and semi-automatic models for crimping and sealing envelopes or bags of heat-sealable foil.

*(Continued on Page 55)*

**MANIFOLD HEAD**
**air-cleans wide mouth containers**





*Air-operated platform with adjustable stops, for elevating multiple-tier cases.*

**M-S FEEDER-CLEANER . . .**

increases cleaning efficiency with heads specially designed for bottle size—gives quick changeover, accurate synchronization. Only one operator is necessary on this low-cost M-S machine which performs smoothly because it has fewer moving parts, fewer operations to air-clean bottles. Custom made to your requirements. Write or wire for information.

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ILLINOIS: KRUSE PACKAGING MACHINERY, 5807 W. North Ave., Chicago
CALIFORNIA: KING SALES & ENGINEERING CO.
441 Folsom St., San Francisco
1823 W. 48th St., Los Angeles


## Permeability of Plastic Bottles Materials

*(Continued from Page 26)*

at 73°). For comparison, turpentine also can be included in this grouping. Here, the results are an actual increase in weight at 73°. This gain may be due to oxygen passing into the bottle at a faster rate than the turpentine permeates outward. A distinct difference in the permeation rates of these aromatics has been pointed out before, but in no case has it been as pronounced.

The highest permeability rates for this polymer are observed with ethyl acetate and acetone. In fact, of the ten polymers reported, Polyether L is the most permeable to these two chemicals.

All of the foregoing has shown that each thermoplastic bottle material has its own characteristic permeability properties and that the influence of the various factors in the permeation process differs considerably from resin to resin.

**Guides to application.** To summarize these permeability data, we can draw a few generalizations which may serve as guides to possible commercial applications for these polymers.

1. Bottles of low density polyethylene are used widely with water and alcohol base products — personal deodorants, nasal sprays, shampoos, etc. Its advantages as a flexible, unbreakable, low cost plastic container with excellent chemical resistance are unmatched by any of the other materials presently available.

2. The lower permeability of the intermediate and high density polyethylenes makes possible the packaging of products not suitable in regular polyethylene. One example is tincture of Merthiolate, which contains 10% acetone. This lower permeability combined with greater rigidity may also allow, in some cases, use of lighter bottle weights with resultant savings in cost.

3. The low permeability to halogenated hydrocarbons and the good strength qualities of the non-plasticized nylon formulation suggest its use in aerosol containers. However, the higher water and alcohol permeation rates of this resin should be considered in its application to commercial aerosol packages. Both plasticized and non-plasticized polymers would also appear favorable for packaging of certain oil-type products.

4. The properties of the vinyls make them useful in the packaging of oils including mineral oil and other petroleum base products. Of course, certain vinyls have been used for some time with human blood.

5. Because of its unusual permeability characteristics, the chlorinated polyether (Polyether L) appears to warrant further consideration as a packaging material.

It cannot be too strongly emphasized that permeability is but one consideration in determining package-to-product application. Thorough study of the actual product in these plastic packages should be the basis for final decision.

1. Pinsky, Nielsen and Parliman — Shelf life in Polyethylene, Modern Packaging, October 1954.

2. WADC Technical Report 53-133, prepared by Plax Corporation under USAF Contract No. AF 33(616)-112.

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REDUCE CLEAN-UP TIME 50%

a thin film of

RELEASE-COTE

on any surface sheds residue glues, adhesives, plastic coatings, inks, paints . . . like magic!

● Machines last longer because RELEASE-COTE repels coating materials, eliminating build-ups that tax motors and moving parts.

● Operators love RELEASE-COTE's gentleness to their hands. A little rubbed on the hands prevents coating material from sticking to the skin and nails.

Available in qt., gal., 5 gal. and tube.

Write for literature.

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Distributed by

POTDEVIN MACHINE CO.

221 North Street, Teterboro, N. J.

Designers and manufacturers of equipment for gluing and labeling, coating, laminating, bag making and printing.

For more information circle No. 240 on Card


## Developing and Operating the In-line Printing of Packages

*(Continued from Page 17)*

individual pouches from a web and do this at a speed of 120 a minute. Use of the vertical printers greatly simplifies our change-over from run to run and assures us a versatility of application, which initially led us to do the whole job as an in-line operation. Aside from the work done within our own organization, we worked very closely with our suppliers. The forming and filling equipment was specially built in order to provide adequate space for this printing unit.

The vertical printers themselves have been worked out to meet our requirements. Further, our suppliers obtained the necessary ink formulation to set the drying action that must complete itself within the nine-inch interval following each printing unit. There is no problem of ink distribution, since the ink is pumped to the top of each vertical cylinder. In effect, the cylinder inks the plate each time it goes around, thus assuring equal distribution.

## CLASSIFIED ADVERTISING

Our classified advertising section is intended for use by those wishing to buy or sell used packaging equipment, to employ packaging personnel, seek such employment, offer or seek business opportunities. It is not available for general advertising. Terms: Cash with order. Rates: Up to 60 words, $10.00. If boxed, $20.00. Up to 120 words, $20.00. If boxed, $40.00. Up to 180 words, $30.00. If boxed, $60.00.

**Circulation this issue in excess of 35,000**

### FOR SALE

**For Sale** — Packaging machine, Battle Creek Model BT30 and Bond M L Dual Filler. Fills, seals folding boxes, both bottom and top. Continuous flow principle. Quickly convertible. Wide range of boxes up to 10 inches in height, 30-40 per minute. Price new machine $15,120.00; this used one $5000.00. Reply to W. J. Wittekind Company, 1041 Richmond Street, Cincinnati 3, Ohio.

**For Sale** — Used Niagara packaging machine Model 200, Serial 179, 115 v. – 60 c. – 2000 w. For cello bag packaging of dry materials. Volumetric control. Capacity 440 packages per hour using 2 girls to operate. Please reply to Pophitt Cereals, Inc., 740 Washington Avenue North, Minneapolis 1, Minnesota.

### SITUATION WANTED

**Plant Manager** or Assistant — Technical education, B.S., labor-management relations, industrial management. Ten years management supervision consumer goods. Publications. Excellent record for organization, human relations, cost reductions, increased efficiency, 41, family. Please reply to Box 101, PACKAGE ENGINEERING, 185 N. Wabash Ave., Chicago 1, Ill.

### HELP WANTED

**Representatives** and Distributors Wanted — Your proven experience & know-how selling Pressure Sensitive Tapes & our Outstanding German "Tesa" Specialty Tapes can be the right combination. If you have what it takes our proposition will be just what you are looking for. Please reply to Box 102, PACKAGE ENGINEERING, 185 N. Wabash Ave., Chicago 1, Ill.

## Industry Literature

*(Continued from Page 53)*

cellophane, and similar materials. They offer a choice of six sealing patterns and additional attachments are available for hole punching, notching, and coding. Circle No. **159.**

### Notched Label Code Dating

Griffin-Rutgers, Inc., offers an illustrated data sheet describing the Codege Mark II. This machine cuts a series of unnoticeable notches in one edge of a packet of labels; the code is easily read with a code card. Labels of all sizes and shapes may be coded in packets up to 500 or more at a time, producing 2000 coded labels/min. Codes can be formed to identify dates, batch numbers, operators, etc., on labels, cartons, and bags. Circle No. **160.**

## What we think

# Let's plan for tomorrow's packaging education

All the talk about today's scramble for an aisle seat on the Milky Way and the equally astronomic questions of paying for it obscure several basic facts of primary concern to technical and operational packaging people. Our real interest should focus on how to prepare now for the fantastic future that will belong to packaging.

### Challenge: More people, more technical advances

Johns-Manville Corporation's far-sighted economist, William C. Bober, recently pointed out to his Harvard Business Review audience that the outstanding impersonal forces of our age are (1) the unbelievable rise in the world's population and (2) the advance of technology and its penetration into every corner of the globe. Mr. Bober's assertion that every 25 years we get a billion more people in the world should stir the imagination of those who package the food and all other products that this exploding population needs.

Regardless of our own views on the politics and economics of today's international affairs, the fact remains that companies everywhere can expect to produce and package their products for global consumption. One of the intriguing trends of our day is that of American companies developing and installing production and packaging operations in foreign plants.

Likewise, we in the United States are finding that European packaging experts, for example, have distinct contributions of their own: Witness the activities of the European Packaging Federation and its members.

Our world of packaging must produce trained people in ever-increasing numbers if we are to meet the challenge of packaging for a mass production economy in the midst of a bursting global population. Packaging education (as our schools now offer it) simply will not do the job.

### Make better use of our universities

Of the universities, only Michigan State has a four-year packaging program. Those of us closely associated with it know that it is just scratching the surface of its opportunities for service to packaging. We expect it to meet these opportunities.

Several months ago we criticized Columbia University for dropping its courses in packaging engineering. Even though we saw Columbia's motive and recognized it was taking the long range view, we regretted the move. The fact that we must prepare for future education should not deter us from making the most of today's facilities — however apparent their inadequacies may be. We must encourage such evening or parttime courses wherever possible.

At the same time we must recognize that packaging is and will be competing for the cream of our nation's youth. The present emphasis on stepped-up education in the basic sciences reminds us that packaging, too, must prepare for its long-range future.

Current confusion about technical education is not confined to packaging. Schools of engineering wonder just how far they should go with specialized courses. Some deans of engineering are incisively cutting the "hardware" (as they term the practical-type courses) from their curricula. There is no easy answer to the question of attaining a balance between the immediate need for practical, operational training and the equally pressing need for graduates trained in sciences — to tackle our problems of the future.

### A graduate school for packaging scientists?

All of us with a stake in packaging's future are facing two fundamental questions: (1) How can we make the most of the *complementing* contributions of Packaging Institute, American Management Association, Society of Industrial Packaging and Materials Handling Engineers, and other groups that serve packaging, as well as those of colleges and universities in conducting programs of immediate benefit in solving today's problems? (2) How should we approach the eventual establishment of a top level of advanced packaging education?

Whether this should be something like the famed Institute of Paper Chemistry, which turns out skilled specialists at the Ph.D. level is a provocative query. And regardless of how we are now meeting today's pressing needs, we must settle for nothing less than this ultimate goal: One or several focal points of packaging education of the highest academic and technical standards.

If we are to have future generations of forward thinkers capable of conceiving and creating far-reaching advances in packaging research and development, and capable of brilliantly translating them into effective production, we must start planning for them now.

Bruce Holmgren

**Editor**

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